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the OIL AND GAS JOURNAL

MARCH 30, 1959

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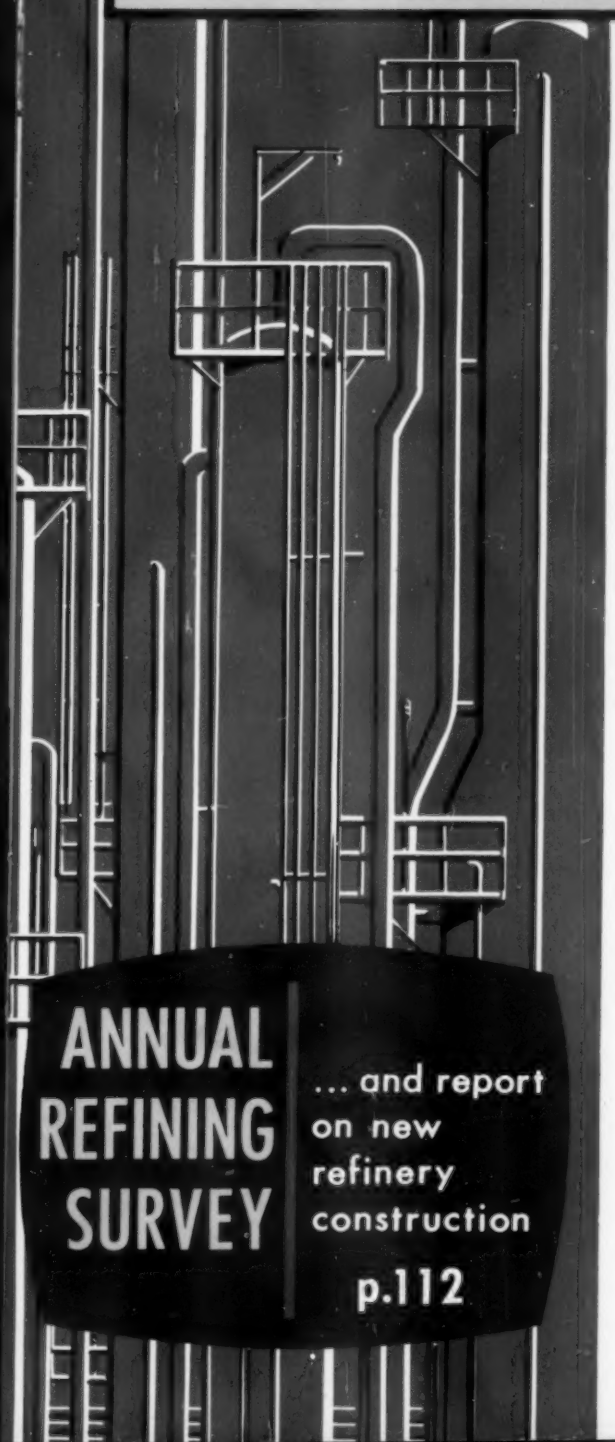

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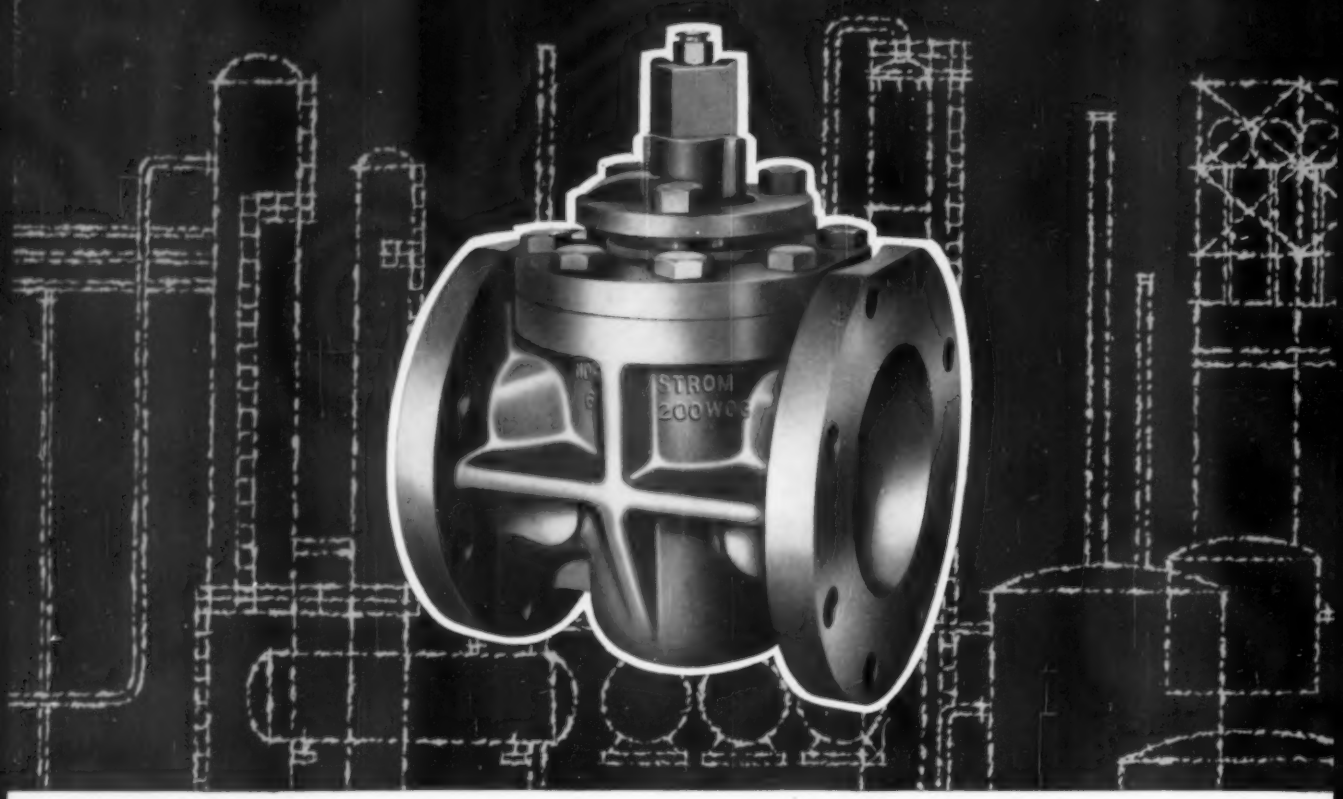

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the OIL AND GAS JOURNAL Newsletter

Tulsa, Okla.
March 30, 1959

Rig operations have taken a healthy jump:

Rotaries operating in the U. S. increased 108 during last week. They had gone up 48 the week before. That's a 2-week gain of 156 rigs or 8.4%.

Rigs at work now total 2,003. It's the first time working rigs have topped 2,000 since the last week of 1958.

Monthly averages last year lagged below 2,000 rigs except for January, November, and December.

Next three quarters promise to be busy for drilling.

Operators say they still plan well programs for the year which mean a total of 52,746 holes. If so, this means plenty of drilling from here on out because completions so far this year have lagged last year.

One larger drilling contractor, Falcon Seaboard, in a report to stockholders last week says it is experiencing unusual drilling activity during first quarter and expects 1959 to be its best year for domestic contract drilling.

▼ ▼ ▼

Business, including oil, expects to spend $32 billion on new plant and equipment this year, about $1¼ billion or 4% more than a year ago.

Securities and Exchange Commission survey shows the petroleum and coal products industry will spend $2,743,000,000 for capital layout compared with $2,431,000,000 last year.

It also noted that first-quarter capital spending would be lower than last year with the big spending starting in 1959's second quarter.

▼ ▼ ▼

Will Lyndon Johnson compromise with congressional foes of depletion allowance on a 5% cut?

North Texas oil producers were assured last week by Rep. Frank Ikard the compromise reports aren't true. Ikard says the Texas delegation will not support any reduction. It was assumed that Ikard was carrying the word from Johnson.

Talk of a compromise worries the North Texans for a good reason: Their effective depletion rate is only 20%, not 27.5% as generally thought.

In one of the few surveys of its kind, Wichita Falls

public accountants examined 1957 income tax returns of 252 North Texas producers operating 3,929 leases with total gross income of $34,102,794.

They found the operators actually got the 20% depletion rate because of high North Texas production costs and clause in law limiting application of allowance to only 50% of net.

Move to clarify depletion law for oil and gas won't get out of committee this session.

Leading members of House ways and means committee fear request by Treasury would bring major floor fight on depletion this session. Treasury's object is to disallow percentage depletion on products.

▼ ▼ ▼

The reserve producing capacity of crude in U. S. is still growing and is now estimated to be at its highest level.

Gulf Oil President W. K. Whiteford says this reserve is now between 2 and 3 million barrels daily. He gave the estimate in testimony before Texas Railroad Commission's annual session on expected demand and desired stock levels (p. 94).

Future of part of Paradox basin lying in Colorado may be settled soon by two wildcats planned by Sinclair.

Company will drill two Pennsylvanian tests in Marble Wash area of Montezuma County. Both are east and south of Texaco Towaoc discovery which flowed 1,200 bbl. daily earlier in month.

Zapata's converted tender is the first floating drill ship to operate in Gulf of Mexico waters. It's on its second well now and has had no problems even in heavy seas.

Drill ship has no platform of any kind. Blowout preventers and other wellhead equipment are supported on the surface casing. If present well finds oil, a protective jacket may be set (p. 102).

▼ ▼ ▼

Don't expect Ohio to put Lake Erie leases up soon.

Chief opposition to leasing valuable lake acreage comes from Cleveland city officials who fear possible pollution of their city water supplies by drilling activity.

Recent success in lake off Pennsylvania stimulated hope that Ohio would offer its lands too. Now it appears this may be some time off.

The Appalachian basin will get a major play in next few years.

Major companies are moving in. Several have opened large exploration offices in Pittsburgh. Leasing is picking up too as interest mounts in the deeper possibilities of basin.

Mississippi is one of hottest exploration targets in U. S. Activity is at record heights. Considerable success is being met, principally in the deep zones of Lower Cretaceous and Jurassic age.

State was one of few to see an increase in drilling during 1958—it looks as if 1959 may be a record year.

▼ ▼ ▼

Pemex has borrowed another $12 million from four U. S. banks. Funds will finance product and natural gas pipelines from Monterrey to Torreon.

Loans made by Pemex this year so far total $72 million. Earlier, $40-million credit was advanced to pay for a 500-mile gas line from Ciudad Pemex to Mexico City. Another $20 million was obtained from Europe to finance petrochemical projects.

One export market is still closed to Americans: Large diameter line pipe to Russia.

Commerce officials again have denied license to export 12,227 tons of 28 and 30-in. pipe to the Soviets. It's the third time Government this year has held big-inch pipe can not be shipped to Russia.

Turbine-type meters are catching on fast.

They are proving accurate, reliable, and less expensive than first thought and apparently are solving the problem of measuring big volumes moved at high flow rates in large trunk lines and at marine terminals.

Rockwell has built one now that can measure crude or products of varying viscosities at flow rates up to 15,000 bbl. per hour (p. 100).

A crude pipeline from wells in Lake Maracaibo to terminal on the shore is being considered by the Sohio-Signal-Pure group.

The line would stimulate development of Venezuelan discoveries by the group.

▼ ▼ ▼

Higher compression trend may be resumed next fall by Detroit auto makers now that 100-octane gasoline generally is available on the West Coast.

No significant boosts were made last fall, due partly to the economy vogue and also to ceiling imposed by California's lower octane levels.

If octanes jump this year because of new car requirements or industry competition, move won't cause refiners any trouble. Tetraethyl lead levels are the lowest in years. Many may see fit to raise octane by boosting lead content rather than raising processing severity or adding new capacity.

Refiners again warn: Higher octanes will have to get higher prices.

Refiners will step up plant efficiency this year. They will operate their plants at about 85% of calendar day capacity compared to 81.2% last year.

Four factors contribute to this improved outlook: Winter demand in first quarter much better than anticipated; lower product imports; healthier stock situation; and a hold-the-line attitude in adding new crude-charging capacity.

Outlook now is for crude runs to average 8,240,000 bbl. daily for the year. On capacity, refiners are planning less than 200,000 bbl. daily net additions, slowest rate of increase since the depression. Continued expansion lies ahead for key downstream processes (p. 112).

Another tanker is loading at Costanza, Rumania, this month with an oil cargo reportedly destined for a northeast American port, probably New York.

Punta Spiga's arrival last month with a 100,000-bbl. cargo from the Black Sea caused a stir in domestic oil circles.

No immediate threat from Soviet block oil exports, however, is seen by Jersey Standard President M. J. Rathbone. He pointed out that these exports totaled only 220,000 bbl. daily in 1958 or about 1½% of the free world market.

On price, Esso Export and Shell even were able to underbid Russians for Argentina's crude-oil contracts.

A new asphalt plant was a money maker for Champlin last year at its Enid refinery.

Realization from asphalt products was more than double that from sale of residual fuels which were formerly produced.

▼ ▼ ▼

Imports must come down fast to meet quotas. They averaged 1,931,800 bbl. daily in latest week. The breakdown was 1,046,300 bbl. daily of crude and 885,500 bbl. daily of products. Quotas are 1,415,000 bbl. daily.

Imports total a week earlier was 1,737,900 bbl. daily and for the same time last year was 1,567,900 bbl. daily.

Industry notes: New safety program of Panhandle Eastern features system of penalties as well as awards. Policy of penalties, ranging from reprimands to layoffs, is attempt to cut down on minor lost-time injuries and accidents caused by disregard for accepted safety rules...Esso Research claims it's impossible for employes to expose themselves to too much radiation at Linden radiation facility...Safety is insured by an intricate series of electrical and mechanical interlock systems...Steel consumers generally are trying to get 90-day inventory of steel stocks by July 1 when steel labor contracts end.

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SPECIAL REFINING SECTION

Refining Capacity Growth Was Moderate in 1958, Will Slow Down in 1959 112

By Larry Resen

Stream-day crude capacity rose 6% in 1958 but little additional capacity is expected to be added in 1959.

Hydrogen treating, after a 27.7% gain last year and even more phenomenal gains in previous years, will rise only 6.2% this year. Catalytic reforming gained 20.9% last year; it's due for only 4.8% increase this year. Catalytic cracking, nearing the saturation level, will have a minor 2.4% gain this year. Alkylation will have a healthy 6.3% gain in 1959.

Annual Survey of Capacities of United States Operating Refineries 117

The Journal annual survey of operating refineries shows that United States' capacities were boosted to more than 10,150,000 bbl. per stream day by January 1, 1959. All figures in the capacity tables are of this date. Additions during 1959 and later can be made to the basic table by consulting the new construction table.

Other capacities for United States' refineries are: (1) vacuum distillation, 3,167,000; (2) thermal operations, 2,103,000; (3) catalytic cracking (total feed), 4,568,000; (4) catalytic reforming, 1,849,000; (5) hydrogen treating, 1,713,000; (6) alkylation, 370,000; (7) polymerization, 145,000; (8) lubes, 180,000; and (9) asphalt, 443,000 bbl. per stream day. Coke capacity is 14,600 tons per day.

Canadian Operating Refineries 142

Crude capacities for Canadian plants jumped from 818,000 bbl. per day as of January 1, 1958, to 886,000 as of January 1, 1959. Other capacities include: (1) vacuum distillation, 316,000; (2) thermal operations, 145,000; catalytic cracking (total feed), 389,000; (4) catalytic reforming, 147,000; (5) hydrogen treating, 131,000; (6) alkylation, 4,920; (7) polymerization, 16,000; (8) lubes, 6,750; and (9) asphalt, 43,000 bbl. per stream day. Coke capacity is 475 tons per day.

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A Graphical Method for Obtaining FCC Regenerator Data 168

By J. J. Blazek

The two important variables in catalytic cracking units, hydrogen on coke and coke-burning rate, can now be determined accurately and quickly by this graph method.

Here Are Important Tips on Process Engineering and Plant Design 172

By D. J. Oriolo

Process engineering is concerned with those activities involving the development and evaluation of processes and the basic design, engineering, and startup of processing plants.

TECHNOLOGY—OPERATION

API Recommends Test for H.-P. Tubing, Casing Connections 181

This is the first recommended basis for comparing connections for service on wells with surface pressure above 5,000 psi.

Drilling Pointers 183

Dog leg speeds mud-tank connections—Motors separated by wall from pumps.

United Gas Uses Gas Turbine, Ebullient Jacket-Water Cooling 184

By H. W. Egger

This is the first centrifugal compressor unit driven by a gas turbine to be used in the origin of the line. Ebullient cooling makes power available for other uses.

Viscous Crudes Respond to Water Flooding 189

Viscous crudes are being recovered efficiently in some Kansas water floods in spite of unfavorable mobility ratios.

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80 Wilson-Snyder ES Centrifugal Process Pumps help keep Texaco's new Puget Sound Works on stream!

Shown are heavily lagged Wilson-Snyder 2 x 3, 2-stage ES pumps handling hydrocarbons at 183 gpm and 902-feet differential head. Wilson-Snyder pumps of other sizes are available for similar services with capacities from 15 to 2000 gpm.

Ten Wilson-Snyder Pumps are in Texaco's new polymerization plant in the Puget Sound Works, the largest being the 3 x 4 x 8½ ES shown in front. Pumps in this plant handle fluids of varying specific gravities under a wide range of temperatures and pressures and have capacities from 40-400 gpm.

This installation is at the crude unit. Eleven Wilson-Snyder Pumps, both steam turbine and motor driven are in service here handling fluids with temperatures up to 691 °F. at capacities from 15 to 515 gpm.

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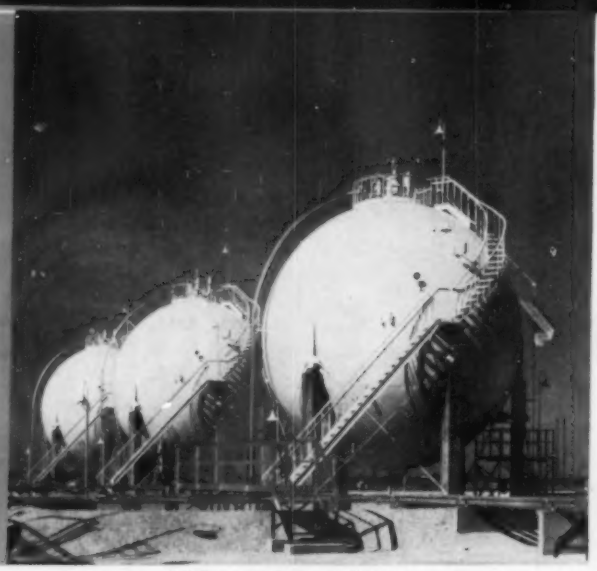

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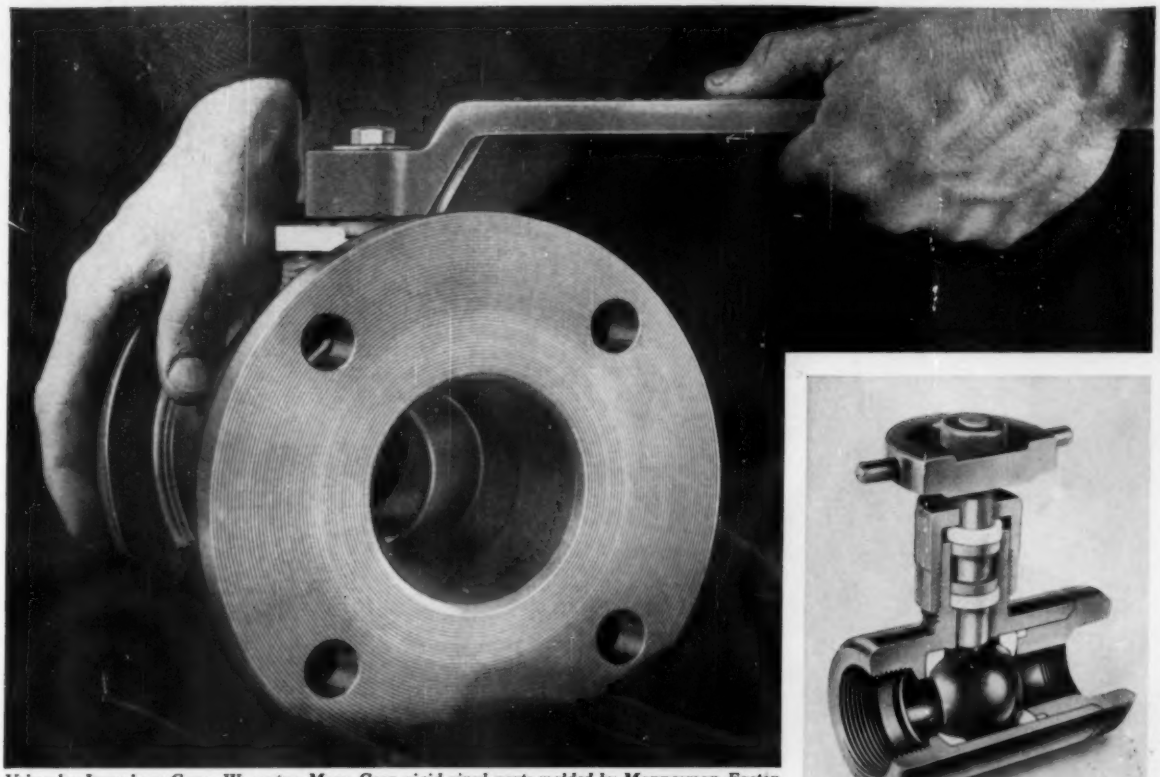

Valves by Jamesbury Corp., Worcester, Mass. Geon rigid vinyl parts molded by Mannesman-Easton Plastic Products, Inc., Easton, Pa. Valves in sizes from 1/2" to 4", shown in large photograph, are rated at 150 psi to 100 F. and at 50 psi to 130 F. They can be remote operated. B.F.Goodrich Chemical Company supplies the Geon rigid vinyl material only.

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  - **Step-down walking beam, providing equal torque loading in either direction.**
  - **Saddle bearing of one-piece construction to prevent misalignment.**
  - **Surfaces of structural members shot-blasted and primed to assure maximum paint durability.**
  - **Built-in ground lubrication with relief valves at pressure-lubricated points.**
  - **Arc-type removable horsehead.**
  - **Four-leg Samson post. Knockdown type provided for export.**
  - **Large, powerful clamshell brake.**
  - **Any type of prime mover—electric motor, medium-speed horizontal engine, high-speed multicylinder engine.**
  - **Reinforced base. All types prime-mover extension bases**

BETHLEHEM STEEL COMPANY
Supply Division
General Offices: 21 E. Second St., Tulsa, Okla.
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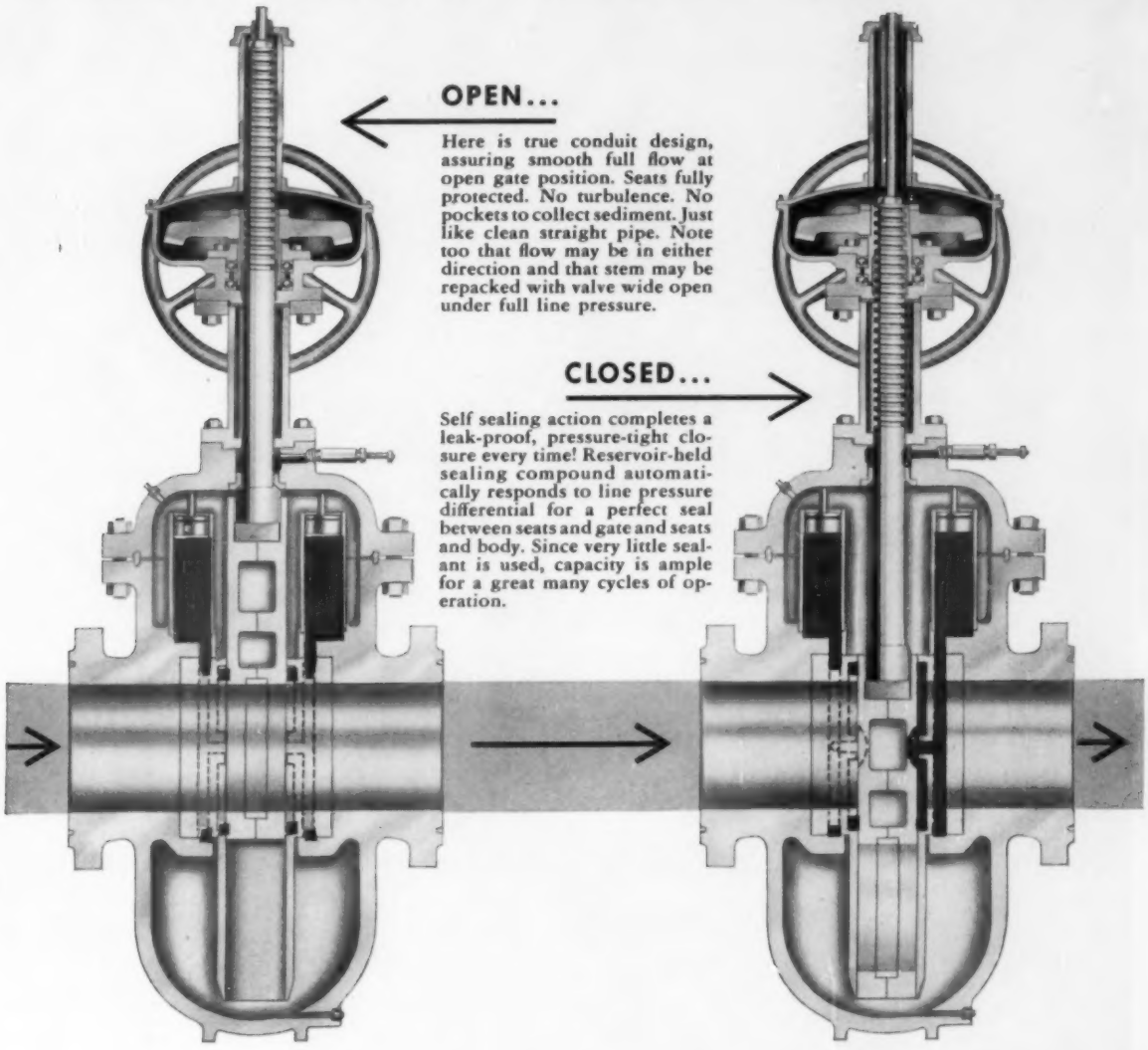
BETHLEHEM STEEL

BETHLEHEM STEEL
SUPPLY DIVISION

It's an "Open and Shut" case for...

DARLING-McEVOY CONDUIT GATE VALVES



OPEN...

Here is true conduit design, assuring smooth full flow at open gate position. Seats fully protected. No turbulence. No pockets to collect sediment. Just like clean straight pipe. Note too that flow may be in either direction and that stem may be repacked with valve wide open under full line pressure.

CLOSED...

Self sealing action completes a leak-proof, pressure-tight closure every time! Reservoir-held sealing compound automatically responds to line pressure differential for a perfect seal between seats and gate and seats and body. Since very little sealant is used, capacity is ample for a great many cycles of operation.

THESE and other features combine to make Darling-McEvoy conduit gate valves unique and unmatched in pipe line service today. They are now available in 4″ and larger sizes, fully field proved, with experience a matter of record on various major lines. For detailed information ask for Bulletin 5402.

DARLING
DARLING
VALVES

DARLING VALVE & MANUFACTURING COMPANY

Williamsport 1, Pa.

Manufactured in Canada by Sandilands Valve Manufacturing Co., Ltd., Galt 19, Ont.

NEW low soda content: another good reason to

mix imagination with Alcoa Hydrated Aluminas

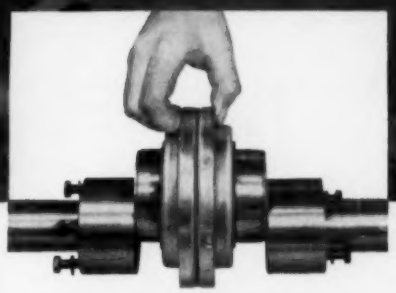
ALCOA now offers you the lowest soda content ever available in commercial grades of hydrated alumina. Typical soda level of new Hydrated Alumina C-35 is only .040% Na_2O . . . making it ideal for use as a noncontaminating catalyst base, or as an ingredient material for fine aluminum chemicals. Here is just one more example of ALCOA's constant effort to match aluminas to product or process needs. It's another good reason why it pays to mix imagination with ALCOA® Aluminas . . . to make an old product better, or a new product possible. There is probably a type and grade of alumina precisely suited to your own needs. You can get complete information by writing ALUMINUM COMPANY OF AMERICA, CHEMICALS DIVISION, 709-C Alcoa Building, Pittsburgh 19, Pennsylvania.

For finer products . . . let Alcoa add new dimension to your creative thinking!

ALCOA CHEMICALS

For exciting drama watch "Alcoa Theatre," alternate Mondays, NBC-TV, and "Alcoa Presents," every Tuesday, ABC-TV

FALK Steelflex SPACER COUPLINGS
save time and money in refinery operations



FALK and STEELFLEX are Registered Trademarks

Cut disconnect-reconnect time by as much as 50%

The FALK Spacer Coupling is specially designed for quick installation or removal *without disturbing the driving or driven unit.* This feature can save you up to 50% in disconnect-reconnect time when critical equipment—a process pump, for example—needs repair or replacement.

Here's another saving: with the FALK Spacer Coupling, you can quickly realign shafts *without the usual loss of operating temperature!*

And still another: you can remove or reinstall the FALK Spacer as a unit *without draining the lubricant.*

Because of its exclusive grid-groove Steelflex design, the FALK Spacer can accommodate residual misalignment—parallel, angular, or (most important) *both.* Also, it provides torsional resiliency that cushions shock and vibration. Thus it saves wear-and-tear on your connected equipment.

To prove these claims and enjoy these savings, install a FALK Spacer on one application—and see for yourself. Consult your FALK Representative or Authorized Distributor.

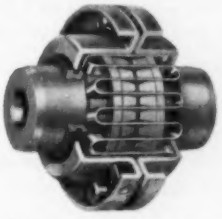
THE FALK CORPORATION, MILWAUKEE 1, WISCONSIN
MANUFACTURERS OF QUALITY GEAR DRIVES AND FLEXIBLE SHAFT COUPLINGS
Representatives and Distributors in many principal cities.

EASY AND QUICK TO INSTALL, DISCONNECT OR RECONNECT

First, mount shaft hubs to allow proper distance between hubs; then, align driving and driven units.

Second, compress Spacer to fit space between hubs and tighten cap screws to pull spacer hubs into the registered fit.

To disconnect, reverse the second step. No draining of lubricant necessary.

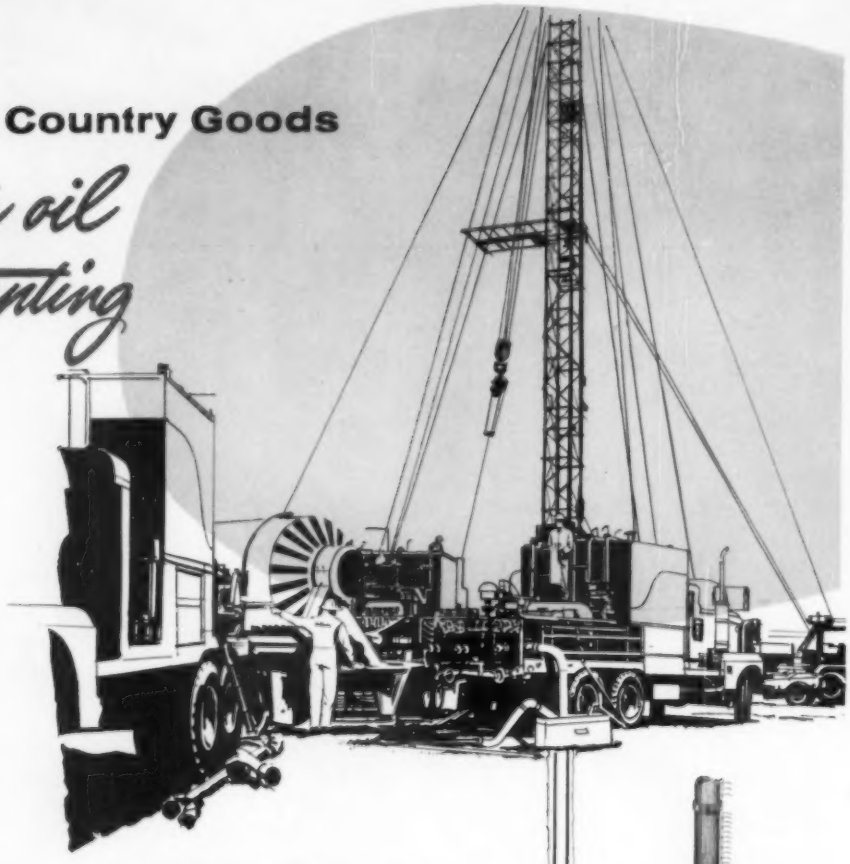


The heart of the FALK Spacer ...the basic Type F Steelflex
Write for Service Manual 4838

FALK
...a good name in industry

Partner in Oil Country Goods

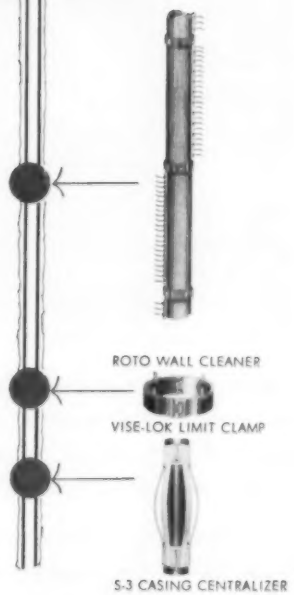
for better oil well cementing

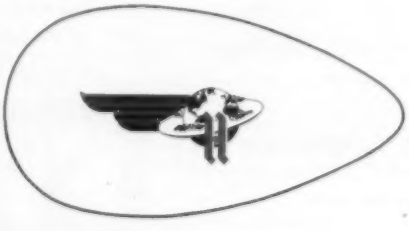


Put the industry's most efficient pre-cementing tools and chemicals to work for you when you get ready to cement your well. Halliburton's specially designed tools and chemicals help prepare your well for a better cementing job.

Halliburton wall cleaners and mud cleanout agent give your well a thorough cleaning, helping to eliminate filter cake that—unless properly removed—can result in a poor bond of the cement slurry. Good cleaning also helps prevent channeling of cement, aids in obtaining a satisfactory casing job, and minimizes future remedial work.

Your first step to a successful well... and greater potential profits ... is in the right direction when you start with a cleanup by Halliburton... and follow with better cementing by Halliburton, world's most experienced oil well cementers.

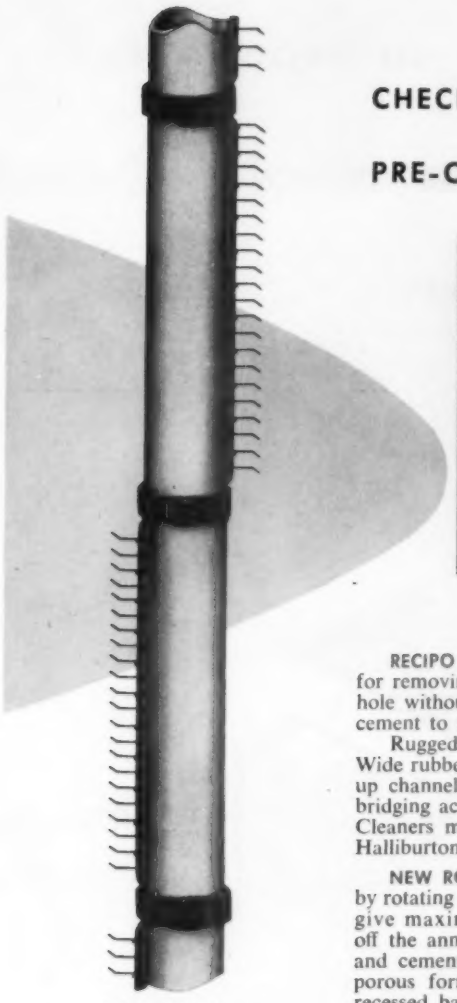




HALLIBURTON

OIL WELL CEMENTING COMPANY

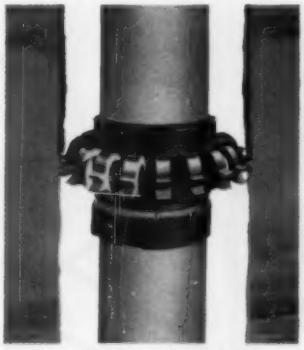
DUNCAN, OKLAHOMA



NEW Roto Wall Cleaner installed with Vise-Lok Limit Clamps

CHECK THESE HALLIBURTON

PRE-CEMENTING PRODUCTS FOR WELL CLEANUP



Recipo Wall Cleaner installed with Vise-Lok Limit Clamps

Mud-Kil

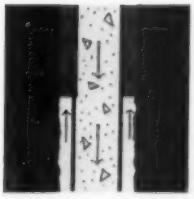
RECIPO WALL CLEANER... A reciprocating cleaner attached to the casing for removing undesirable mud cake from pre-determined points in the bore hole without damage to the wall of the hole. Makes for better bonding of cement to formation and casing.

Rugged cleaning fingers thoroughly clean wall when casing is reciprocated. Wide rubber fingers clean broader area of bore hole wall and aid in breaking up channeling of cement. Wide fluid passage areas are provided to reduce bridging action of filter cake cuttings and circulating pressures. Recipo Wall Cleaners may be installed on 4½", 5½", 7" and 7⅝" O. D. casing with Halliburton Vise-Lok Limit Clamps.

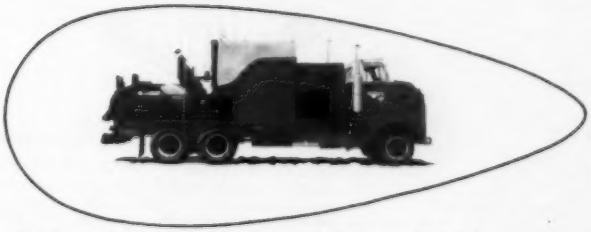
NEW ROTO WALL CLEANER... Efficiently designed to remove mud cake by rotating casing at the surface. High strength steel, claw-type cleaning spikes give maximum cutting action. The Roto Wall Cleaner will not bridge off the annulus; allows free-flow of fluids while running casing, circulating and cementing. Lost circulation problems are reduced; mud cake through porous formations is undisturbed while casing is run. The new standard recessed base Roto Wall Cleaner may be installed on 4½", 5½", 7" and 7⅝" O. D. casing sizes with Halliburton Vise-Lok Limit Clamps or with tack welding on any size casing.

MUD-KIL... Helps to effectively neutralize Portland or Pozmix Cement against the set retarding properties of quebracho, tannins, starch, sodium carboxymethyl cellulose and lignite commonly found in drilling muds. Pumping time and compressive strength of cement are unaffected when Mud-Kil is added. A multiple-purpose additive for open hole cement plug-back, or liner jobs; squeeze cementing operations, or in "tailing out" on primary casing cement jobs.

MCA (Mud Cleanout Agent)... A most effective mud dispersant solution, used ahead of the cement slurry to help clean out mud and soft filter in the annular space, reducing the possibility of cement channeling and permitting a better cement bond to the well bore.



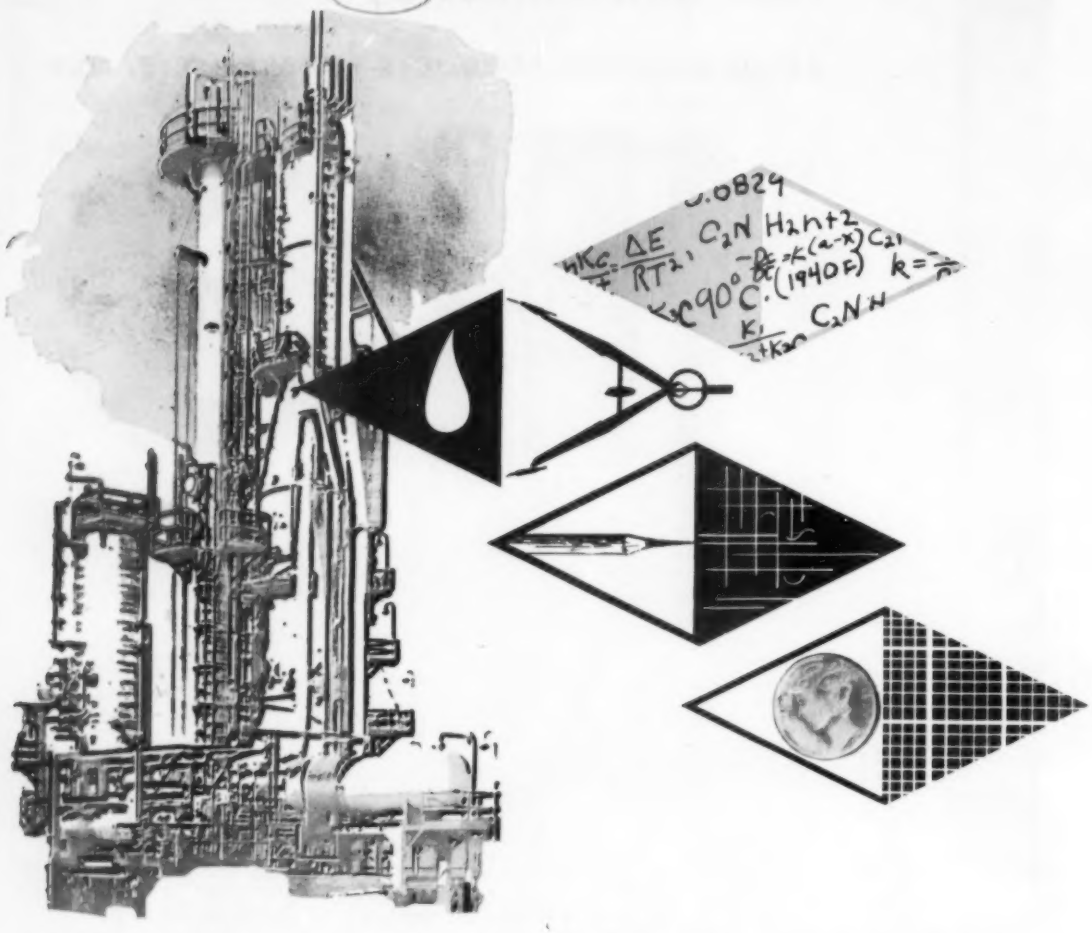
MCA (Mud Cleanout Agent)



CEMENTING SERVICES

284 SERVICE CENTERS—JUST MINUTES AWAY FROM YOUR WELL

intangibles were never so important



PRECISION CONSTRUCTION

Worker recruiting and training . . . special safety programs . . . on-the-spot solutions to pressing problems . . . these and other extras are included in Procon service. Applying such intangibles to construction of petroleum, chemical and petrochemical plants is the specialized function of Procon. Modern, efficient construction techniques form but a part of the precision construction system developed by Procon. That is why a Procon-built plant can be depended upon to more than meet specifications.

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PROCON *Incorporated*

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WORLD-WIDE CONSTRUCTION FOR THE PETROLEUM, PETROCHEMICAL, AND CHEMICAL INDUSTRIES

"that's Service for sure..."

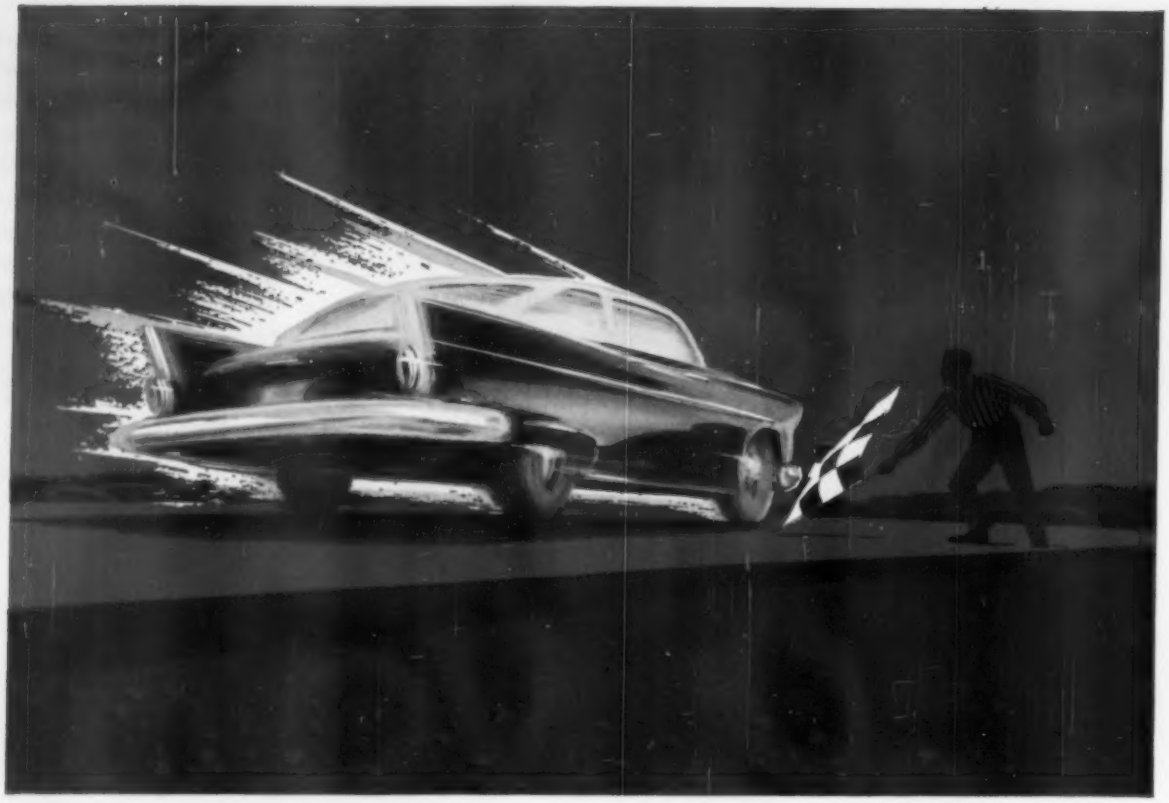
Moving out under snow-whipped winter skies or searing summer sun, the men of BJ Service are trained to deliver results, not excuses. With these men, "service" is more than a word. It is an attitude, a credo, a way of life . . . a calm confidence born of long experience, that there are no jobs too tough to be done. For the objective of BJ Service, now as always, is to deliver the *most efficient* service in the field. For cementing, fracturing, acidizing or wire line service that pays off at the wellhead, call the company whose name *is* service—***BJ Service, Inc.***

BJ SERVICE, INC.

A BORG-WARNER SUBSIDIARY

LONG BEACH, CALIFORNIA • FORT WORTH, TEXAS

Stations in all major oil fields



For those new, higher compression engines... a new Catforming catalyst

The trend to higher compression engines is here to stay. And wide-awake refiners have to produce fuels to suit these up-to-the-minute engines.

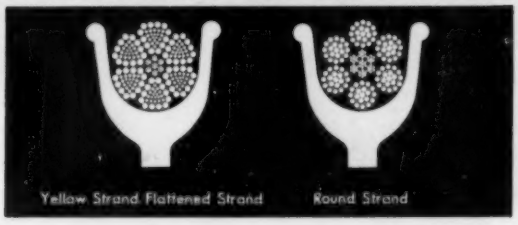
Atlantic is proud to offer an advanced Catforming catalyst designed to economically produce higher octane gasolines . . . *and it can be utilized in your present equipment.* For more information, write, wire or call The Atlantic Refining Company, P. O. Box 8138, Philadelphia 1, Pennsylvania.

Higher gasoline octanes through Pentafining

You can convert the low-quality n-paraffins (C_6, C_8, C_7) in your gasoline pool to high octanes! Pentafining, the process developed by The Atlantic Refining Company, makes it possible. For full particulars, write today to The Atlantic Refining Company, P. O. Box 8138, Philadelphia 1, Pennsylvania.

It's the CATALYST that counts

ATLANTIC



HOW

Houston Contracting Company

CUTS WIRE ROPE COSTS 50% ON TOUGH BACKFILL JOB

This was a tough one. Wide ditch – heavy, wet dirt – high line speeds over a short distance – severe reverse rope bend – an extra large bucket. Rapid wear and fatigue actually tore apart ordinary round strand rope to the tune of five to seven 50′ lengths per day. Then Houston Contracting Company selected Yellow Strand Flattened Strand Wire Rope. Now, one length per day is used in place of five to seven. They cut rope costs by 50%, saved substantially in man-hours and machine down time.

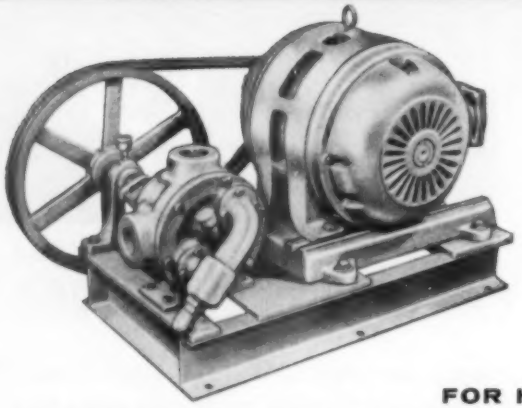
What made the difference? Compare the two illustrations above: See how each strand of Yellow Strand Flattened Strand is laid up in a triangular pattern. Contact with the sheave groove is made by *many* wires instead of just a few. Note the marked increase in compactness in the Flattened Strand, with greater crush resistance and 10% greater metallic area. This is the design that makes ropes, sheaves and drums last longer! For complete details about Yellow Strand Flattened Strand, contact your distributor or check with us. Broderick & Bascom Rope Co., 4203 Union Blvd., St. Louis 15, Mo.

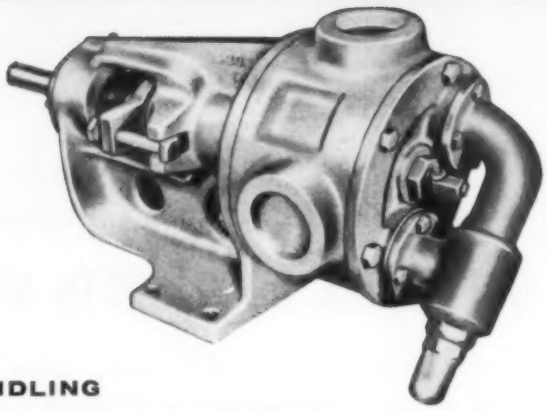
Yellow Strand®

WIRE ROPE SLINGS CLIPS

NOW...FOR GENERAL INDUSTRIAL USE

DEMING ROTARY PUMPS





FOR HANDLING

SOLVENTS • FUEL OILS • LUBRICATING OILS • CHEMICALS • ALKALIES

The complete Deming Rotary Pump line is now available in sizes ranging from ⅜" through 8" for pressures to 200# and capacities to 1050 gallons per minute.

You'll want to know more about the Deming Rotary Pump line! Send today for complete descriptive literature.

The DEMING Co.

303 BROADWAY • SALEM, OHIO

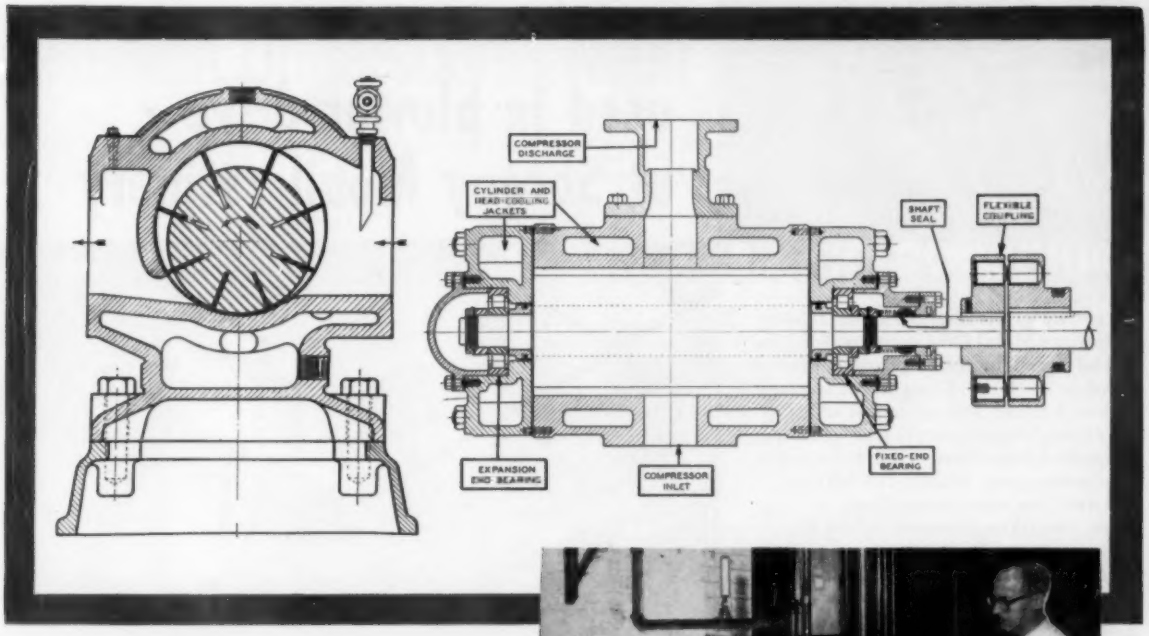
Send me Literature on the Deming Rotary Pump Line.

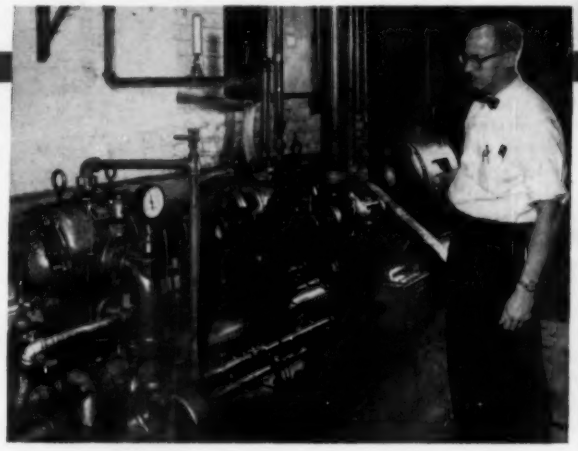
NAME_____

COMPANY_____ POSITION_____

ADDRESS_____

CITY_____ ZONE____ STATE_____





Hard service never affected this Fuller rotary's original output—230 cfm. of air at 90 lb. G., reports Mr. Schott, chief engineer, Thomas C. Wilson, Inc., Long Island City, N.Y.

FULLER ROTARY COMPRESSOR RUNS 13 YEARS WITHOUT DOWNTIME

A Fuller rotary at Thomas C. Wilson, Inc. got its first maintenance shutdown recently, for renewal of roller bearings and rotor vanes—after running without downtime since 1945.

4 years of 24-hour service. The Wilson plant makes tube cleaning equipment, tube expanders and portable pneumatic tools, and so makes heavy daily demands on shop air. For the first four years, three-shift operation kept the Fuller rotary running round the clock. Since 1949, it's been working eight-hour shifts.

Simple design means trouble-free service. Besides bearings, the only moving parts in a Fuller vane-type rotary compressor are the cylinderical rotor and the blades. These compensate for wear automatically. Cylinder head slips off, permitting blade and bearing inspection in a matter of minutes.

Compact and vibration-free. Direct-drive system saves space. Simple, rugged design gives constant service without extensive supervision. Thus, Fuller rotaries can be installed out-of-the-way—on upper floor, on balconies, in basement corners, using low-cost, light-weight foundations.

1189
C-340

Write today for detailed information on the full line of Fuller rotary compressors for in-plant services, gas gathering, and industrial refrigeration.

FULLER COMPANY
GENERAL AMERICAN TRANSPORTATION
TRADE MARK

FULLER COMPANY
132 Bridge St., Catasauqua, Pa.
SUBSIDIARY OF GENERAL AMERICAN TRANSPORTATION CORPORATION
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Fuller
....pioneers in harnessing AIR

PIONEERS OF HIGH-EFFICIENCY VANE TYPE ROTARY COMPRESSORS SINCE 1930

FARREL SPEED INCREASER

used in blower drive at Socony Mobil refinery

In service at the East St. Louis refinery of Socony Mobil Oil Company, Inc., the Farrel speed increaser pictured here is rated at 2875 HP. Designed to transmit power from an electric motor to a Carrier centrifugal compressor, this unit features several construction refinements that assure long, trouble-free service.

Gears are continuous-tooth herringbone, precision-generated by the Farrel-Sykes process. Both gears and pinions were completely finish-machined on their shafts to insure concentricity of pitch diameters with axes of rotation. Teeth were lapped to provide the smooth working surface so essential in high-speed operation.

The rugged gear case preserves original alignment of working parts. Oversize shafts guard against torsional deflections under peak torque variations. The high-speed shaft is a heat-treated, alloy-steel forging; the low-speed shaft is a forging of heat-treated carbon steel.

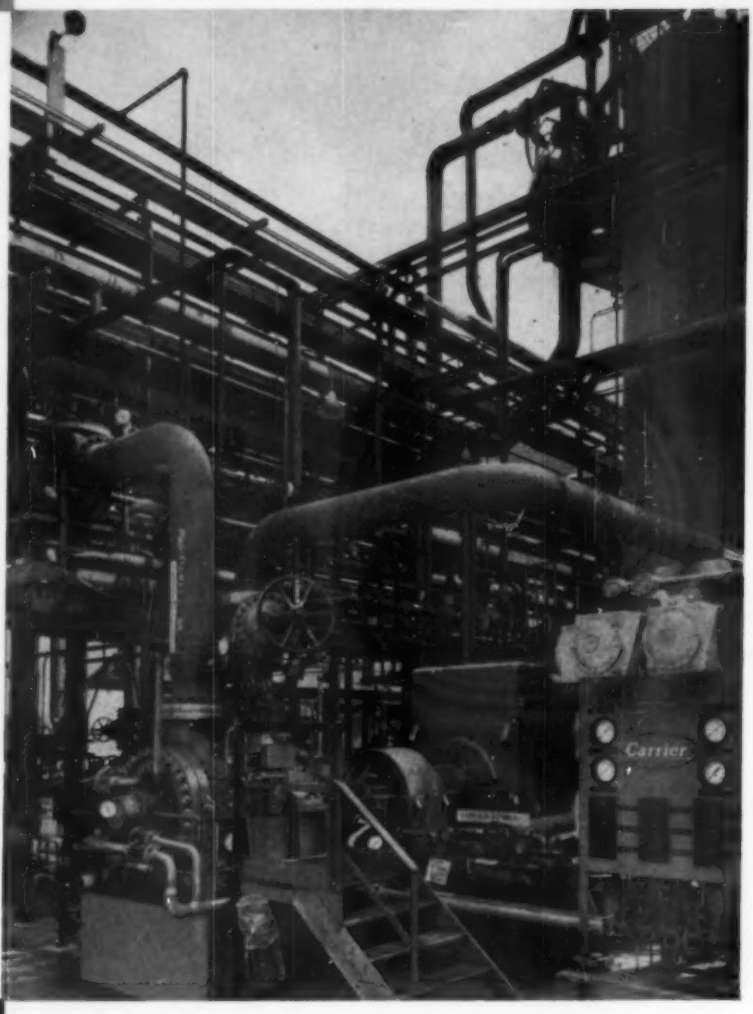
Farrel high-speed gear units are made in fifty-two sizes with speed ratios ranging from 1:1 to 40:1. They are described fully in *new* 28-page bulletin 451. Send for a copy today.

FARREL-BIRMINGHAM COMPANY, INC.
ANSONIA, CONNECTICUT

Plants: Ansonia and Derby, Conn., Buffalo and Rochester, N. Y.

Sales Offices: Ansonia, Buffalo, Boston, Akron, Ann Arbor (Mich.), Chicago, Minneapolis, Fayetteville (N. C.), Los Angeles, Salt Lake City, Tulsa, Houston.

European Office: Piazza della Republica 32, Milano, Italy.



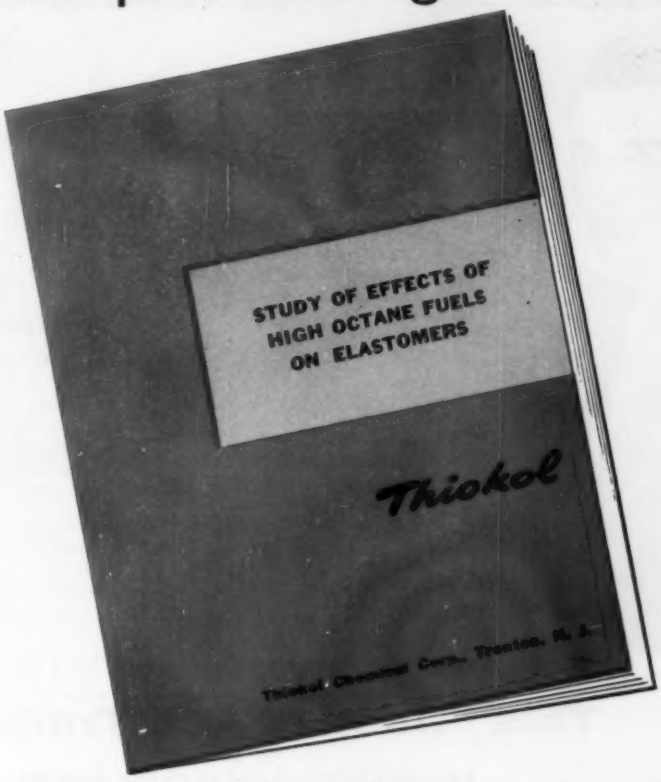
ABOVE: View at Socony Mobil refinery showing Farrel SI-18 high-speed gear unit at work.

LEFT: Rigid housing of the Farrel unit can be seen in this close-up.

Farrel-Birmingham®

FB-1146

Research Underscores Need of New Approach to Manufacture of Hose and Other Rubber Equipment Exposed to High Octane Gasoline



Laboratory study shows dangerous degradation of present elastomers under new aromatic fuels

The trend to higher octane gasolines dictates a re-evaluation of rubber requirements – in the petroleum field – at refinery, transportation and service station levels. Exhaustive tests by THIOKOL point up the need.

Six different types of synthetic rubber now widely used – including THIOKOL ST and FA polysulfide crudes – were used for the tests. Immersed in fuels of varying aromatic content, from 25% to 100%, the elastomers were measured for volume swell, tensile strength, and low temperature properties. Most synthetics showed a marked reduction in physical properties and serviceability, while the THIOKOL crudes satisfactorily resisted "high octane rot."

The detailed results of this THIOKOL study hold great significance for suppliers in the rubber industry. Coupon will bring you a copy of the complete report.

FOR MORE INFORMATION:
Mail coupon to Dept. 81, Thiokol Chemical Corp., 780 N. Clinton Ave., Trenton, N. J. In Canada: Naugatuck Chemicals Division, Dominion Rubber Co., Elmira, Ontario.

Gentlemen: Please send me a complete report of your aromatic fuel study.

Firm_____

Street_____

City_____ State_____

Your Name_____

Thiokol®
CHEMICAL CORPORATION

®Registered trademark of Thiokol Chemical Corp. for its liquid polymers, synthetic rubbers, rocket propellants, plasticizers and other chemical products.

So many ways the ***FISHER/MAN***
can give you a helping hand with the

WIZARD II
PRESSURE CONTROLLERS

- Two Position Controller
- Proportional Controller
- Proportional Controller —Remote Set
- Differential Proportional Controller
- Pressure Transmitter
- Differential Proportional Controller— Remote Set
- Proportional Reset Controller
- Differential Proportional Reset

This "Jack of ALL Trades" is surprisingly low in cost

The partial list of applications at left tells you why the Wizard II is so aptly named. Probably no other controller in the Fisher line is as versatile. Available in brass, steel or stainless steel Bourdon tubes for ranges from 25 to 10,000 psi. Brass or stainless steel bellows available for low pressure service from 30" Hg Vacuum to 30 psi.

Fisher has carefully designed each component of the new Wizard to satisfy the most rigid process control requirements. A completely descriptive and illustrated booklet on the Wizard II is yours for the asking. Write for Bulletin D 4150 A.

IF IT FLOWS THROUGH PIPE ANYWHERE IN THE WORLD... CHANCES ARE IT'S CONTROLLED BY...

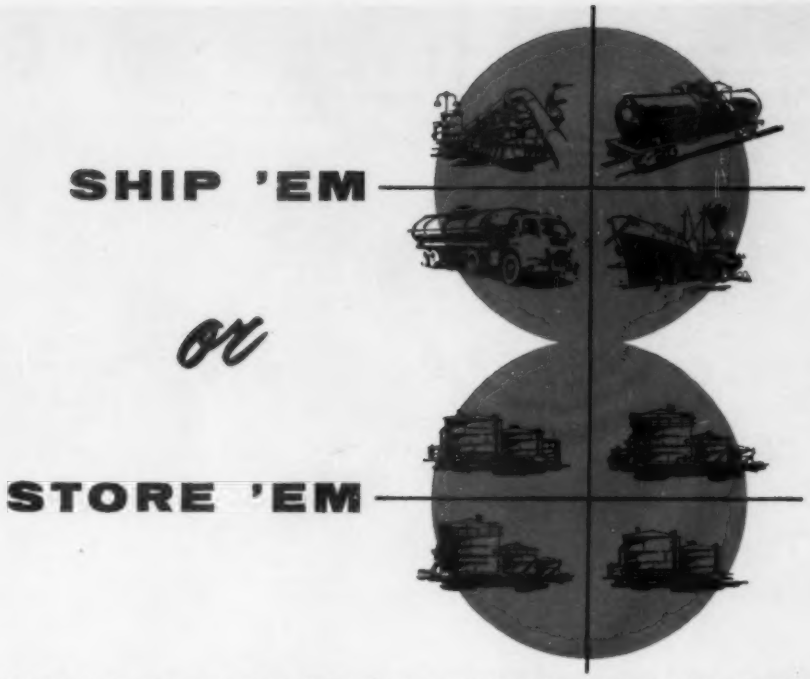
FISHER GOVERNOR COMPANY

Marshalltown, Iowa / Woodstock, Ontario / London, England

CONTINENTAL EQUIPMENT CO. DIVISION, Coraopolis, Pennsylvania

FISHER Controls

SINCE 1880



NALCO-TREATED FUEL OILS STAY FRESH!

Get rid of the hurry-up-and-sell pressure caused by unstable fuel oils that darken and sludge up when stored or shipped any distance. New Nalco 303-AC is the fuel oil dispersant-stabilizer that gives you *best* control of sludging tendencies—keeps fuel oils refinery-fresh, bright, and sludge-free even when shipped thousands of miles and stored for months.

Ask for product information on this new chemical for distillate fuels. It is available promptly from your Nalco Representative, or from Nalco direct.

NATIONAL ALUMINATE CORPORATION 6242 West 66th Place, Chicago 38, Illinois

Northwestern United States, Hawaii and Alaska: The Flox Company, Inc., Minneapolis 3, Minnesota
Canada: Alchem Limited, Burlington, Ontario • Italy: Nalco Italiana, S.p.A. • Germany: Deutsche Nalco-Chemie GmbH • Spain: Nalco Espanola, S.A.

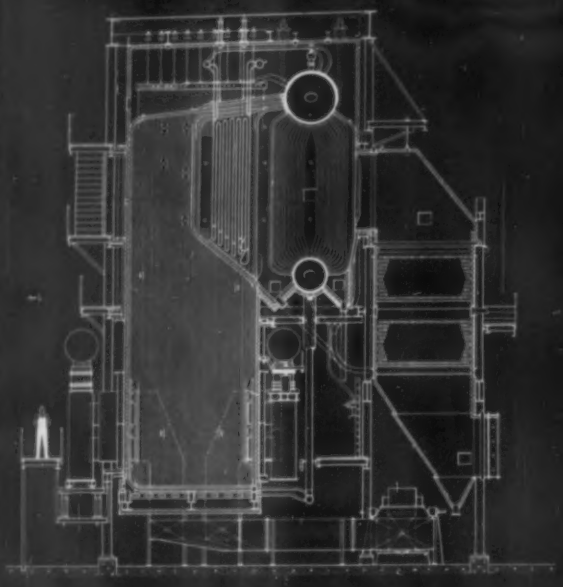
Fuel oil at *left* is fresh from refinery, bright and clear. *Center*, Nalco-treated oil is bright and sludge-free after four months. *Right*, untreated sample in four months time has darkened considerably, already begun to sludge.

Nalco®
PRODUCTS

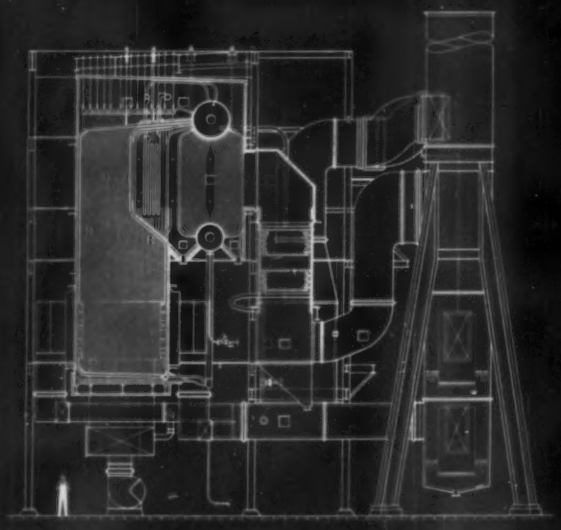
SERVING THE PETROLEUM INDUSTRY THROUGH PRACTICAL APPLIED SCIENCE

Nalco CHEMICALS

This unit delivers 175,000 lb of 750F steam per hour at 650 psig. In addition to CO gas, it burns pitch, refinery gas and Bunker C oil.



One of two CO boilers for a Texas refinery. Oxygen for combustion is supplied by the exhaust from the gas turbines which drive the regenerator compressors. Steam conditions are 177,000 lb per hr, 625 psig and 700F.



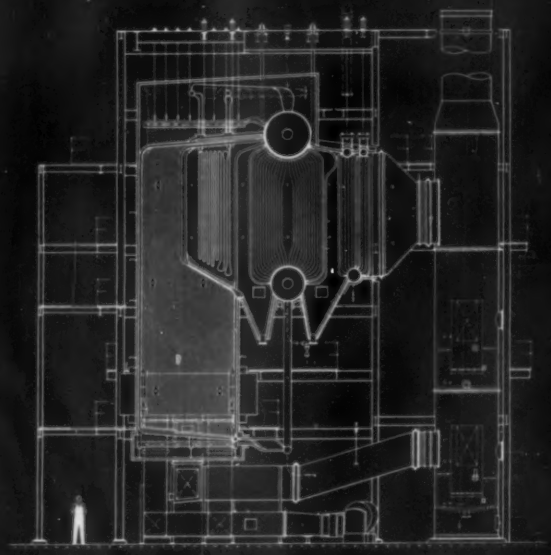
IF YOU'RE LOOKING FOR THE BEST CATALYST REGENERATOR GAS

Here are 8 reasons why

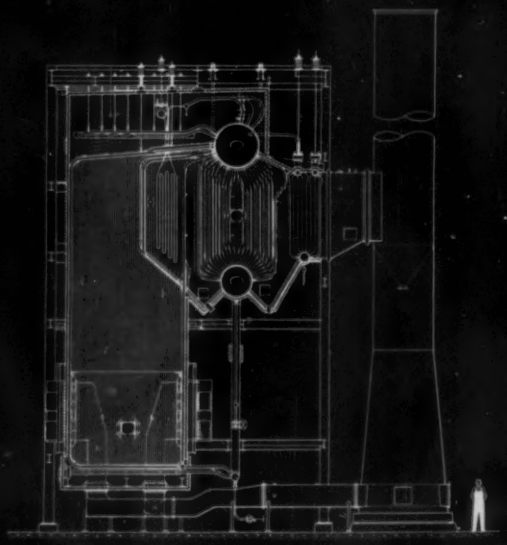
1. **YOU'LL WANT HIGH AVAILABILITY**
   And the records show that the first CO Boiler placed in service by C-E has been on the line for more than two years without a single unscheduled boiler outage.
2. **YOU'LL WANT OPTIMUM RETURN**
   And CO Boilers by C-E burn regenerator gas efficiently *from minimum to maximum loads.*
3. **YOU'LL WANT LOW POWER CONSUMPTION**
   And CO Boilers by C-E provide minimum air pressure loss and minimum fan horsepower requirements.
4. **YOU'LL WANT LOW MAINTENANCE**
   And double steel, skin cased CO Boilers by C-E contain a minimum of exposed refractory.
5. **YOU'LL WANT THE MOST EFFECTIVE USE OF MATERIALS**
   And C-E makes optimum use of boiler and superheater – gas passage areas and heating surfaces are uniformly distributed across the width of the unit.
6. **YOU'LL WANT ADVANCED DESIGN**
   And C-E Tangential Burners provide complete and positive mixing of air, auxiliary fuel and CO gas, preparing the combination for instantaneous ignition on injection in the furnace.
7. **YOU'LL WANT MAXIMUM CONTROL OF THE COMBUSTION PROCESS**
   And CO Boilers by C-E offer individual, shielded cut-off dampers for each CO gas burner and individual air control for every burner.
8. **YOU'LL WANT A PRODUCT THAT HAS PROVEN ITSELF**
   In terms of general experience, a total of more than 675 tangentially fired C-E boilers have been purchased to date for use with various fuels. As to specific experience with lean fuels, C-E – in addition to its CO Boiler installations in refineries – has installed more than 150 boilers burning blast furnace gas . . . a fuel similar to CO gas with a heating value of about 80 Btu per cubic foot.

ALL TYPES OF STEAM GENERATING, FUEL BURNING AND RELATED EQUIPMENT; NUCLEAR REACTORS;

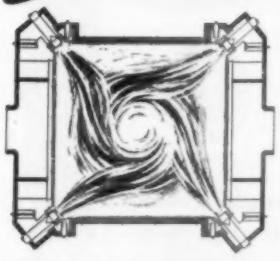
This unit is designed to produce 85,000 lb of 750F steam per hour at 625 psig. Note the C-E seal tank arrangement in the bottom-supported stack.



In its third year of service, this unit provides 100,000 lb of 550F steam per hour at a pressure of 250 psig. It has been off the line only when the cat cracker was removed from service for scheduled maintenance.

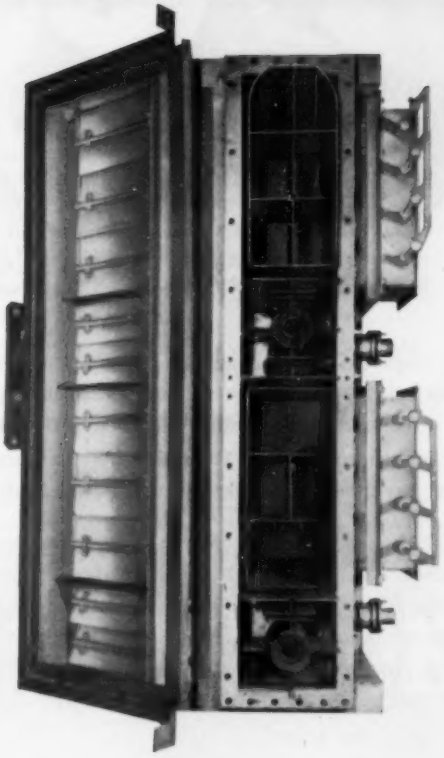


BOILER TO BURN *See* C-E



Plan view diagram showing principle of tangential firing in a completely water-cooled furnace.

The C-E Tangential Burner for CO gas. Zone controlled, dampered air inlets are shown at left, dampered CO gas inlets at right. The center panel is a furnace view of the burner The oil burners in the cen ter and bottom compartments are flanked by flat head burners for natural or refinery gas firing. CO gas is admitted through the other ports.

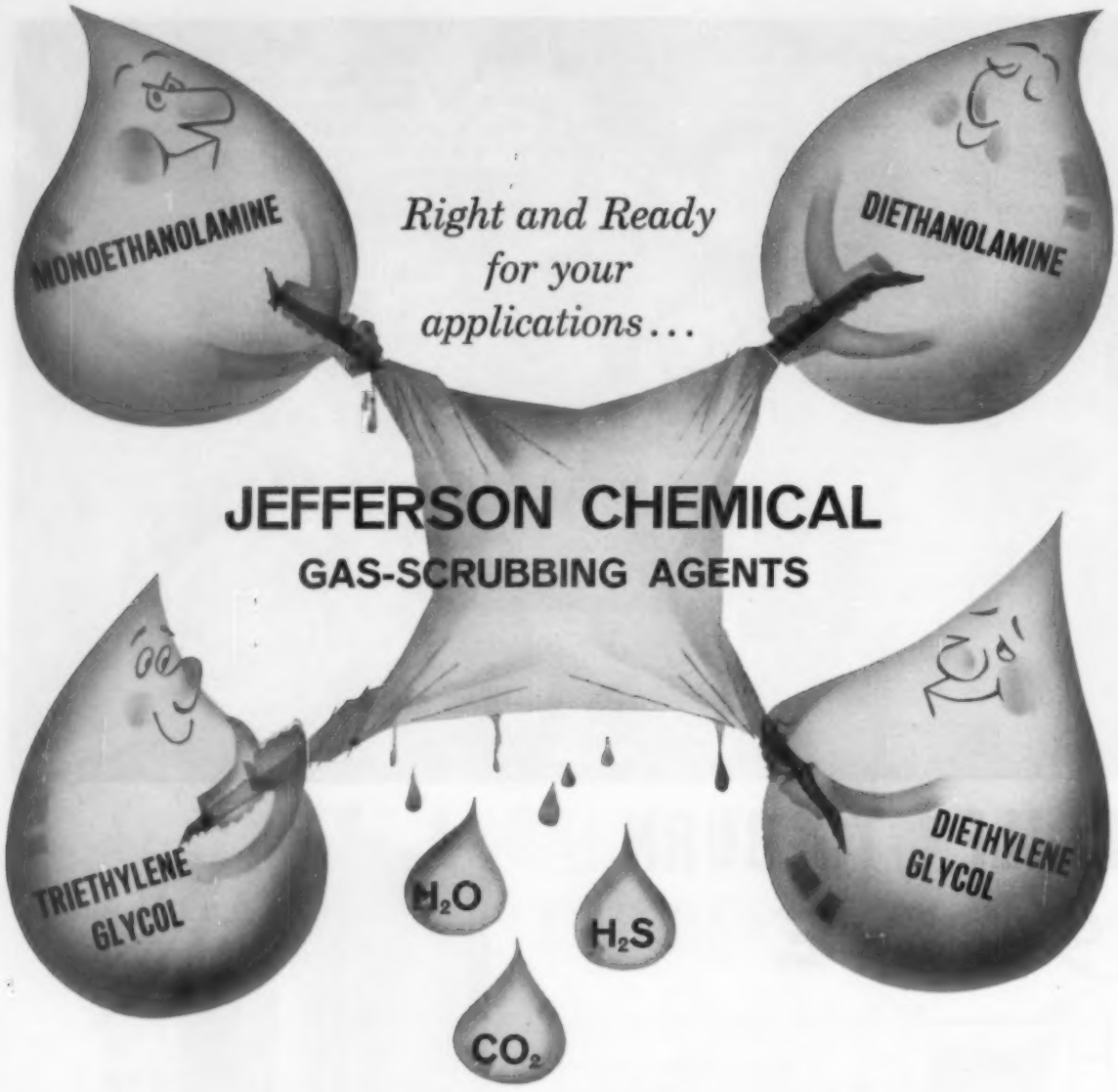


COMBUSTION ENGINEERING

C-148

Combustion Engineering Building
200 Madison Avenue, New York 16, N. Y.

PAPER MILL EQUIPMENT; PULVERIZERS; FLASH DRYING SYSTEMS; PRESSURE VESSELS; SOIL PIPE



Whatever your applications in natural gas sweetening, refinery stream sweetening, sulfur recovery, gas dehydration, and carbon dioxide absorption . . . Jefferson Chemical has the right products in the special grades and quantity you desire.

You may utilize the most convenient size shipment and carrier for your production and storage needs . . . single-product or compartmented tank cars of 4,000- to 10,000-gallon capacity, single-product or compartmented tank wagons of 1,000 to 4,000 gallons, or 55-gallon drums.

Combine these high purity chemicals and prompt, accurate shipments with Jefferson's experience and complete willingness to render every possible technical assistance, and you have a first-rate source for your "Gas-Scrubbing" needs. Ask your Jefferson man at 1121 Walker Avenue, Houston 2, Texas.

JEFFERSON CHEMICAL COMPANY, INC.

HOUSTON • NEW YORK • CHICAGO • CLEVELAND
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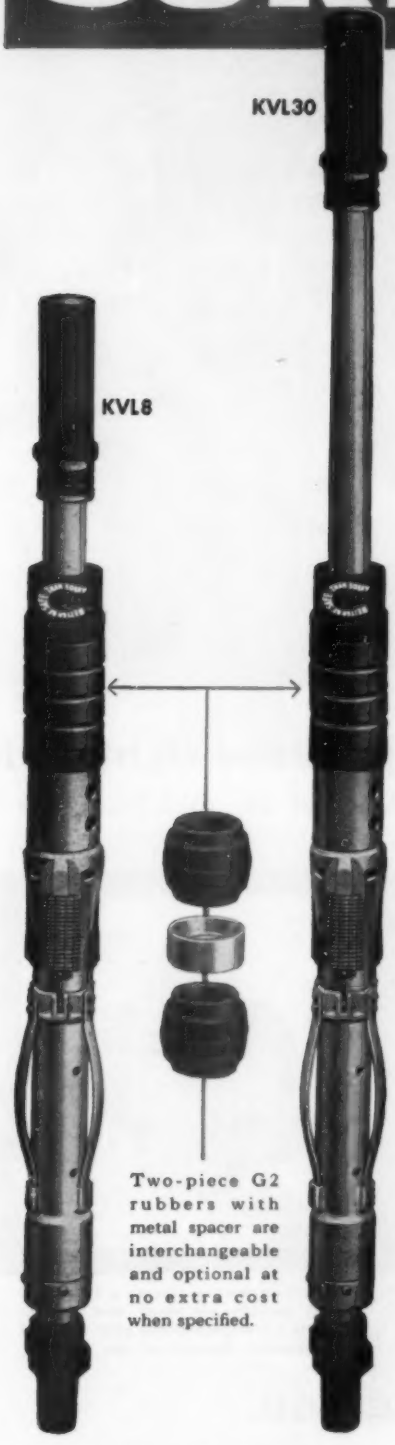
Ethylene Oxide, Glycols, Dichloride • Ethanolamines • Morpholine • Piperazine
Polyethylene Glycols • Nonyl Phenol • SURFONIC® Surface-Active Agents
Ethylene Carbonate and Propylene Carbonate • Caustic Potash • Caustic Soda
Soda Ash • Sodium Bicarbonate

Essential Chemicals From Hydrocarbon Sources

118

SAFE and SURE

GUIBERSON'S KVL PACKERS



Two-piece G2 rubbers with metal spacer are interchangeable and optional at no extra cost when specified.

With Automatic Latch

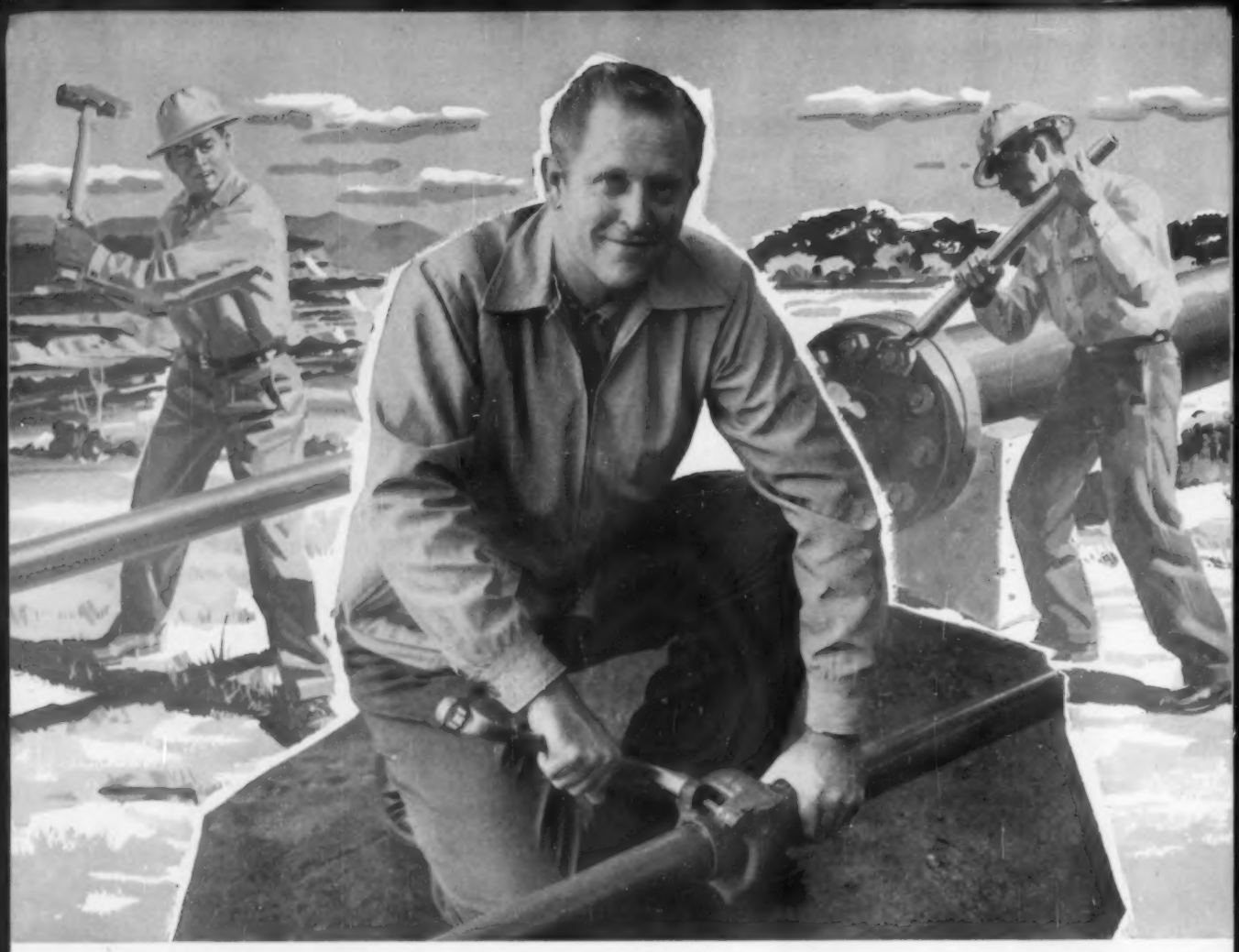
Operators who want extra assurance that a packer won't come unlatched going in, depend on Guiberson KVL packers. Rugged and durable, KVL packers have earned a reputation for dependable performance in deep and medium depth wells. These retrievable packers are easy to set and release, with ample bypass and positive seal. When running into a liner the KVL stays latched and drag springs provide an excellent guide — features operators like. For conserving gas energy and increasing production in flowing wells; for completing wells by circulation; for acidizing, repressuring and dozens of other uses, the KVL is unsurpassed.

- Made as the KVL30 with 30" valve stroke or KVL8 with 8" valve stroke for standard below-packer circulation. (Both packers also made with perforated mandrel for circulation above packer.) Available in casing sizes 5" through 9⅝".
- Valve has two independent sealing elements, a tapered metal valve and seat and a set of oil-resistant seal rings, affording double-sealed protection.
- Rubbers made of special oil and gas resistant compound. Will not vulcanize to casing — recover original shape when released.

THE GUIBERSON CORPORATION

ESTABLISHED 1919
DALLAS, TEXAS
U. S. A.

Sold by Oil Field Supply Stores Everywhere



It takes so little effort to get the job done right with

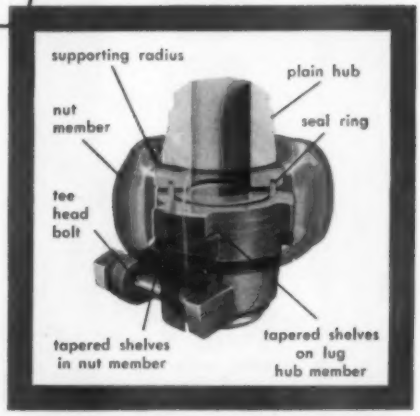
UNIBOLT COUPLINGS

● One man, with a light-weight wrench, can make up or break out the largest size UNIBOLT Coupling (42") in no time at all and with very little effort. The largest size Coupling requires only two bolts, and sizes up to 5" are one-bolt design.

The UNIBOLT principle eliminates all threads between the component parts. Instead, tapered shelves on the nut and lug hub members travel against each other in a wedging action when the bolt is tightened. This leverage exerts tremendous pressure on the seats and seal ring.

The UNIBOLT Coupling is stronger than, say, flanged unions because its design places more metal in shear. Yet, it is lighter in weight than other couplings because it is so compact. UNIBOLT Couplings should last indefinitely because they require no destructive hammering for assembly or dismantling. And, their gaskets and seal rings are readily replaceable and obtainable from any supply store.

For any coupling job on threaded, butt weld, or socket weld pipe, or for any pressure vessel closure, UNIBOLT Couplings are your best buy.



The above drawing shows a UNIBOLT Coupling partially cut away and the nut member in a transparent blue color to reveal the mechanical features of the coupling.

THORNHILL CRAVER CO.

P. O. Box 1184, Houston, Texas

ARE YOU GETTING YOUR SHARE OF THE HIGH OCTANE MARKET?

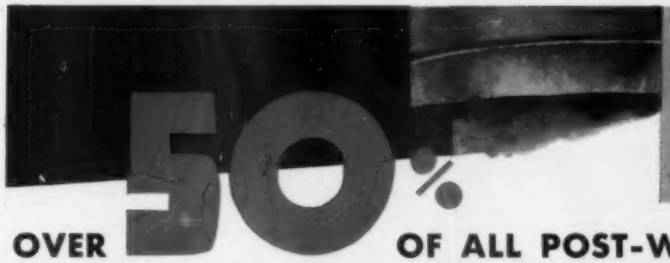
The consumption of Alkylate is growing for both government and civilian use, and this demand is expected to continue, at least into the middle 1960s. To get your share of the high octane market, consider adding an Alkylation Unit to your facilities as soon as possible.

The Oil and Gas Journal says, "Of the five typical high-quality blends which go into premium gasoline, alkylate is by far the best performer . . . more and more refiners are being pushed to include alkylate in their motor fuels. Heavy competition . . . is responsible for the new emphasis on alkylation."

	Research octane (RON)	Motor octane (MON)	Sensitivity (RON minus MON)	Road octane (Union town)
Alkylate	103.0	104.5	−1.5	107.5
Reformate extract	103.7	94.0	9.7	103.5
C_5 plus reformate	103.0	93.5	9.5	102.5
C_5 plus reformate	100.0	91.7	8.3	100.0
Catalytic cracked	99.0	87.5	11.5	98.0

Reprinted courtesy The Oil and Gas Journal (Aug. 4, 1958)

WHY ALKYLATE IS THE KEY TO CURRENT GASOLINE BLENDS . . .



OVER 50% OF ALL POST-WAR HF ALKYLATION UNITS OPERATING IN NORTH AMERICA WERE DESIGNED, ENGINEERED AND BUILT BY TRECO*

The Refinery Engineering Company has designed, engineered and constructed more HF alkylation units than all other companies combined.

THE TRECO LIST INCLUDES:

Shell Oil Company of Canada	1500 BPSD
NCRA	1522 BPSD
Cosden Petroleum Company	2068 BPSD
DX-Sunray (Tulsa)	2470 BPSD
DX-Sunray (Duncan)	3500 BPSD
CRA	1106 BPSD
Anderson-Prichard Oil Corp.	2150 BPSD
Bell Oil & Gas Company	1000 BPSD
The Carter Oil Company	2300 BPSD

Treco, with an outstanding record of fast refinery completion, can have your alkylation unit on stream QUICK. A telegram, telephone call or letter will bring complete information.

*to September 30, 1958

....talk with the TRECO man.....

TRECO

A DIVISION of VITRO CORPORATION of AMERICA

The REFINERY ENGINEERING Company

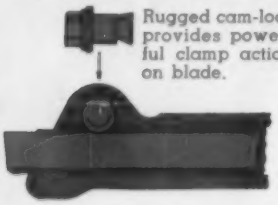
FARMINGTON NEW YORK TULSA TORONTO

MORE THAN MEETS THE EYE!

FOR INSTANCE

Here are two examples typical of Williams cost-saving features.

WILLIAMS CUTTING-OFF AND SIDE TOOL HOLDERS

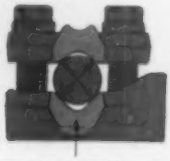


Rugged cam-lock provides powerful clamp action on blade.

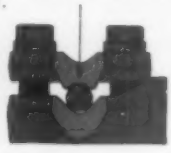
SIZE FOR SIZE SAME HOLDER TAKES BOTH STANDARD CUTTING-OFF BLADE AND SIDE TOOL BLADE. ONE HOLDER DOES THE WORK OF TWO. TOOL INVESTMENT IS CUT IN HALF.

WILLIAMS BORING TOOL HOLDERS

EACH HOLDER TAKES MANY SIZES OF BARS WITHOUT THE USE OF SLEEVES OR BUSHINGS WHICH CAN LEAD TO SPRING AND CHATTER.



V-BLOCK CONSTRUCTION PREVENTS CHATTERING SINCE BARS ARE GRIPPED AT FOUR POINTS AND CANNOT MOVE VERTICALLY OR HORIZONTALLY.



LOOK behind the performance of any Williams Tool Holder and you will find one or more superior features which make the big difference in rigidity and versatility ... that save so many machine shop dollars.

Buy Williams BETTER TOOLS FOR BETTER WORK from Catalog 303

FOR PROMPT, PERSONAL SERVICE — CALL YOUR LOCAL DISTRIBUTOR

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WILLIAMS DROP FORGED TOOLS OF INDUSTRY

J. H. WILLIAMS & CO.

DIVISION OF UNITED-GREENFIELD CORPORATION

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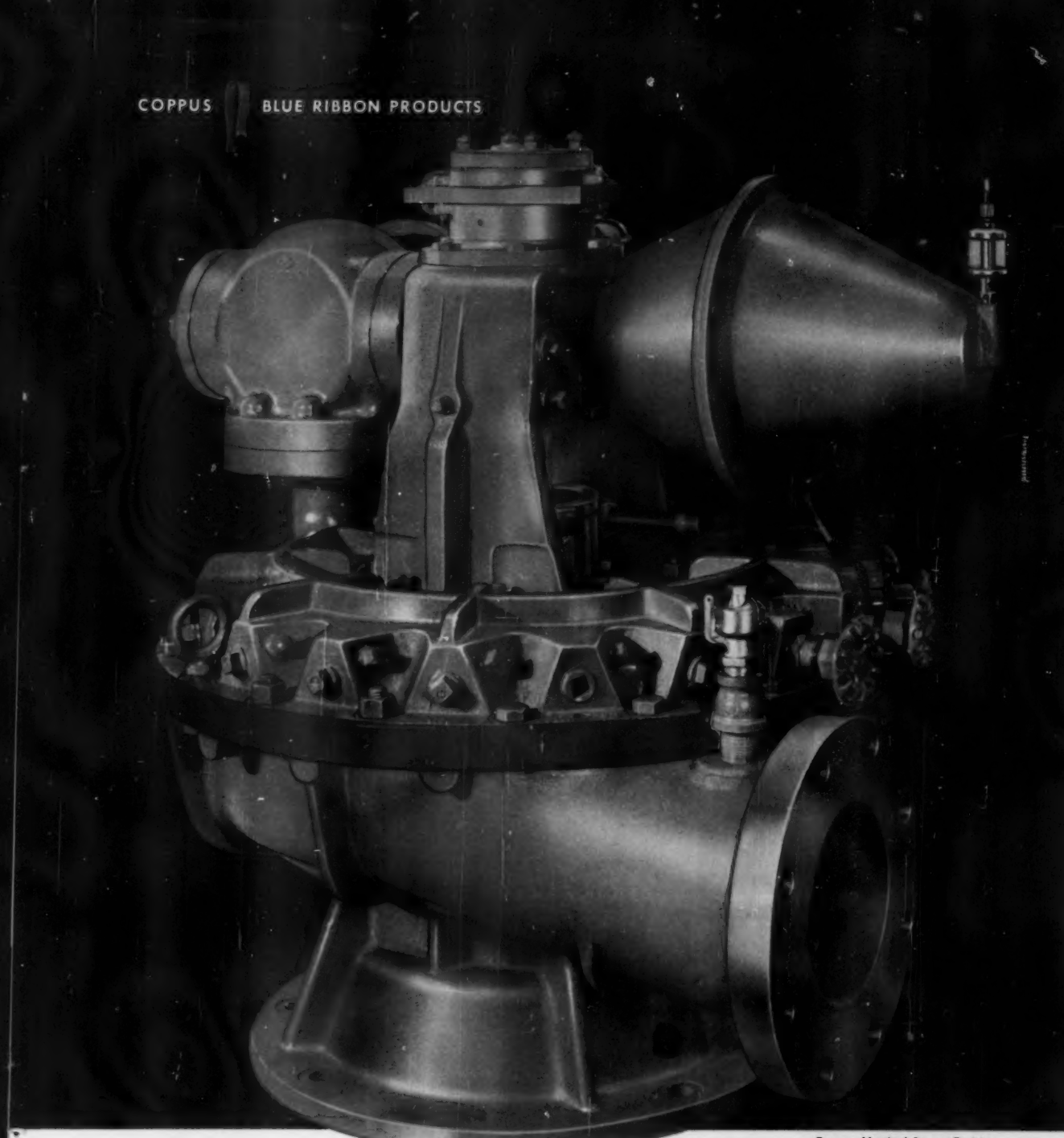
COPPUS BLUE RIBBON PRODUCTS



Coppus Vertical Steam Turbine

THE MARK OF QUALITY — There's no better test of a turbine's quality than performance. And the new, ruggedly designed, power-packed Coppus Turbines pass all performance tests with top honors! Small wonder. Coppus quality is literally designed and built into them. Their super stamina is the end-product of painstaking craftsmanship, finest materials and methods, thorough testing and control. Each truly deserves its Blue Ribbon . . . assurance of *complete* reliability.

Typical Coppus Blue Ribbon features are: *totally enclosed governor . . . totally enclosed and independently operated safety trip . . . easily replaceable packing and bearings . . . multiple steam nozzle control . . . brake rim for added safety . . . wide bucket "L" type wheel (optional) for minimum water rate.* You get higher efficiency operation . . . less down time . . . lower maintenance costs.

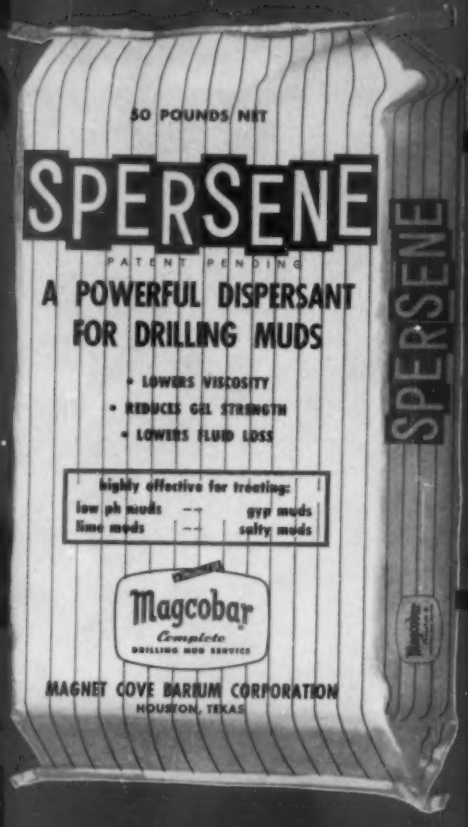
Coppus Turbines are built to customers' specifications, including API and NEMA standards. Send for Catalog 200. Get complete details on Coppus Turbines. Sizes from 1 HP to 250 HP. Write COPPUS ENGINEERING CORPORATION, 263 Park Avenue, Worcester, Mass. Sales Offices in *Thomas' Register*.

COPPUS
STEAM TURBINES

Now

SPERSENE

Magcobar's ***new*** all-purpose dispersant cuts costs ***in any kind of mud***



another *well done*

Spersene, a very versatile thinner, performs well in any mud. Its powerful thinning action combined with low cost make it a unique chemical for treating any drilling mud. You need no longer stockpile a number of dispersants at your well to meet different mud conditions. Now, you can simplify mud treatments with this new all-purpose dispersant and cut mud chemical costs, too.

Spersene costs less when you buy it; costs much less when you use it. As the tables show, Spersene lowers viscosity more effectively, at less cost, than any of today's leading thinners. This means a lower cost per barrel with Spersene. When projected to well volume, it means surprising savings. Whether you are using high or low pH mud, gyp mud, lime mud, or seawater or brackish mud, laboratory tests prove that Spersene

	Amount (pounds)	MATERIALS	Average Cost (Cents)	VISCOSITY (Yield Point-lb./100 ft.^{2})
gyp muds	1	Spersene	16.5	7
	1	Thinner A	18.5	14
lime muds	3.0	Spersene	49.5	6
	3.0	Thinner A	65.5	16
low pH muds	1	Spersene	16.5	8
	1	Thinner A	18.5	12
	2	Thinner B	20.0	20
	1	Thinner C	18.0	18
	1	Thinner D	17.0	31
sea water muds	4	Spersene	66	1
	4	Thinner A	74	3

is more efficient on basis of costs than any other dispersant. And it is very stable against the upsetting effect of salt.

Spersene is one more specific Magcobar solution to the problem of high drilling costs, one more development from the Magcobar laboratories that will increase your profit through more economical drilling. From spudding in to total depth, you'll find that the right products *used right* by Magcobar engineers can cut your drilling costs, too. Write for the new bulletin on Spersene.

Wherever your drilling operations, you can use Magcobar engineering and products. There are more than 500 stockpoints in the U.S. and Canada. Elsewhere, write Foreign Operations, P. O. Box 6504, Houston, Texas

with Magcobar Technology

Magcobar® Complete DRILLING MUD SERVICE

MAGNET COVE BARIUM CORPORATION

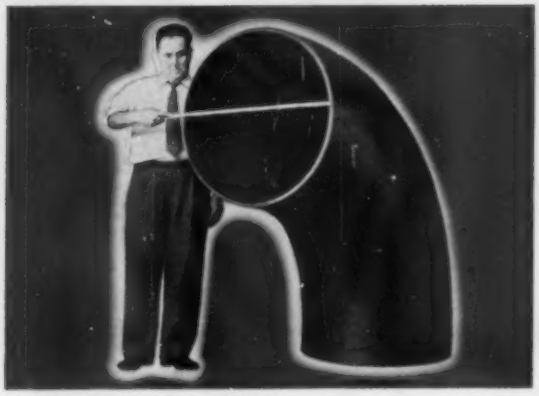
Houston

MIDWEST PIPELINE WELDING FITTINGS

SAVE TIME . . . CUT COSTS . . . SOLVE PROBLEMS

CONTOUR ELBOWS

Originated by Midwest and available in 22", 24", 26" and 30" sizes. Angles 10°, 15°, or 30° with 3D radius, providing a long sweep for easy pipe cleaning. 8" tangent at each end removes weld from highly stressed curved section and facilitates alignment. Uniform concentricity permits smaller angles to be obtained by cutting elbow. Available in various wall thicknesses of carbon steel, high yield and low alloy materials. Write for data sheet.

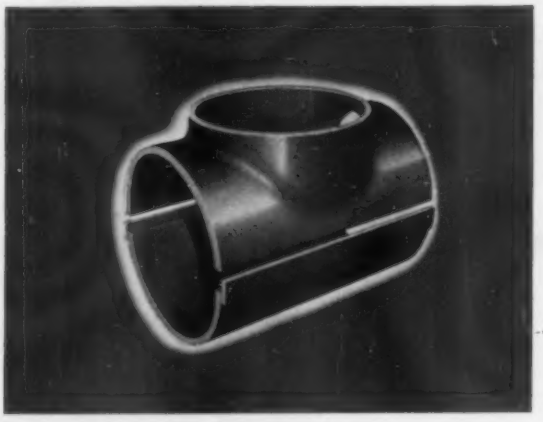


LONG TANGENT ELBOWS

Cost no more than ordinary elbows and are available up to 36" OD in wide variety of materials and wall thicknesses. Tangent at each end equal to ¼ nominal pipe size up to 24" OD—all larger sizes have 6" tangents. These added straight ends save pipe and often eliminate short nipple and extra weld; they remove circumferential welds from point of greatest stress . . . make lining up easier, save time and expense in welding. Write for Catalog 54.

REDUCING ELBOWS

Takes the place of straight elbow and reducer, thus saving one weld, requiring less space and reducing turbulence of flow. Stock sizes available up to 30" OD and in reductions to one-half of large diameter. Being fabricated from plate, it can be made in special thicknesses and materials. Write for data sheets.



WRAP-AROUND SADDLES

"Complete encirclement" type of welded branch reinforcement for making hot taps is available with or without welding strap and from carbon steel or high yield materials. In addition to fitting shown, other types illustrated in Section 8 of ASA B31.1 are available. Write for Data Sheet No. 20.

CAP SADDLES

Reinforcement for nozzle connection into cap. Available in sizes up to 24" on 36" in carbon steel and high yield materials.

Recognizing the fact that conventional welding fittings do not always best meet pipeline needs, Midwest some years ago began the development of special fittings. These are designed for a specific job . . . to save time, cut cost and improve pipelines. The unique Midwest method of manufacture makes the use of special materials easy, economical and permits better delivery . . . it also often enables us to improvise to exactly meet unusual conditions. Write us regarding your requirements.

MIDWEST PIPING COMPANY, INC.

Main Office: St. Louis 3, Missouri (P. O. Box 433)

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LOS ANGELES 33—520 ANDERSON ST. • MIAMI 34—2103 LE JEUNE RD.
NEW YORK 7—50 CHURCH ST. • PITTSBURGH 19, PA.—437 GRANT ST.
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7676

SEE WHY
LQ600®
PAYS ITS OWN WAY IN MAINTENANCE SAVINGS

One look at the precision-machined alloys in the LQ-600 Valve helps explain its maintenance-saving performance. Seats and discs are made of Brinalloy®, the exclusive Lunkenheimer alloy that actually outwears 500 Brinell Stainless Steel or Case-Hardened Stainless exceeding 1000 Brinell. Add Stemalloy®, the most durable stem material ever put into a valve, and you have the two big reasons why LQ-600's are setting new standards of performance everywhere they are installed.

Compare this performance to any other valve in its class. Call your Lunkenheimer Distributor for a test installation . . . or write The Lunkenheimer Co., Cincinnati 14, Ohio.

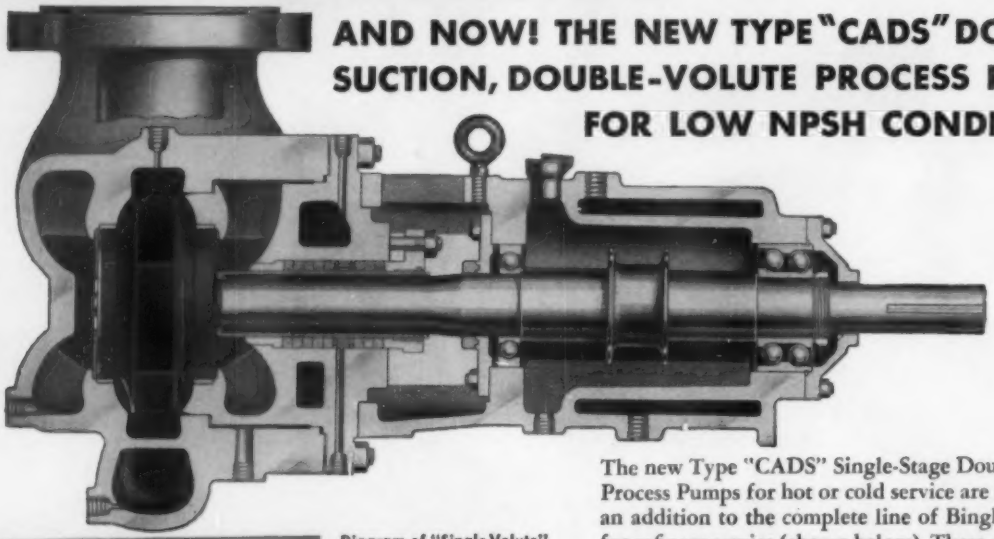
LUNKENHEIMER QUALITY

LUNKENHEIMER®
THE ONE *Great* NAME IN VALVES

Bingham REFINERY PUMPS

designed **HOT or** including

AND NOW! THE NEW TYPE "CADS" DOUBLE-SUCTION, DOUBLE-VOLUTE PROCESS PUMPS FOR LOW NPSH CONDITIONS



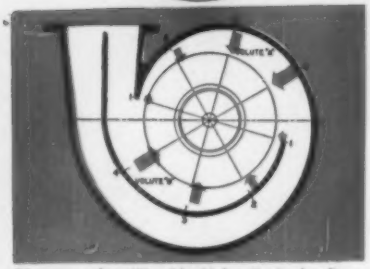


Diagram of a "Double Volute" single discharge case of a single stage pump (above), showing equal pressures on opposite sides of impeller. There is no "SIDE-PUSH"... insuring low maintenance.

Diagram of "Single Volute" pump case (below) showing unequal pressures at opposite points around the periphery of the impeller. These unequal pressures cause "SIDE-PUSH" on the rotating elements, causing wear of rotating parts and, frequently, high maintenance.

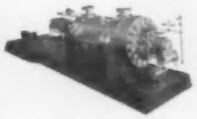
The new Type "CADS" Single-Stage Double-Suction Process Pumps for hot or cold service are available as an addition to the complete line of Bingham Pumps for refinery service (shown below). These new pumps, like other Bingham Process equipment, feature unit-type bearings and rotating assemblies which, with spacer-type couplings, are readily removable without disturbing suction or discharge piping, or drivers.

The new Type "CADS" has a "Double-Suction" impeller with exceptionally large eye areas, thus making it particularly suitable for low NPSH conditions. With a double suction impeller, the stuffingbox is under suction pressure only. The new Type "CADS" has been thoroughly field tested, and has rendered efficient, reliable service — with low maintenance — wherever it has been installed. Your nearest Bingham office will be glad to give you full details on request.

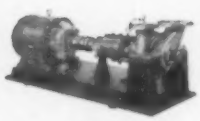
TYPICAL BINGHAM "DOUBLE VOLUTE"

Bingham Type HPD "Double Volute" Multi-Stage Double Case "Hi-Press" pump for extremely high pressure service.

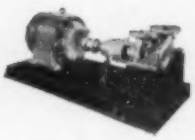
Bingham Type VS Single-Stage "Double Volute" Wet-Pit Pump for high capacity, medium head service.



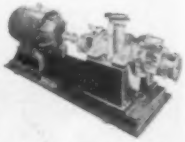
Bingham Type CP "Double Volute" Multi-Stage, Double-Case pump for hot or cold service.



Bingham Type CKA "Double Volute" Single-Stage Koke-Krusher for coke-laden pumpage.



Bingham Type CAD "Double Volute" Single-Stage Process Pump.



Bingham Type CM vertically split-case two-stage pump for hot service.

to meet all Operating Conditions for

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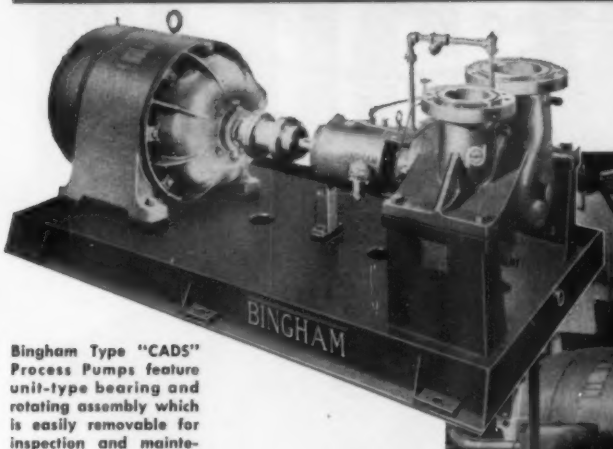
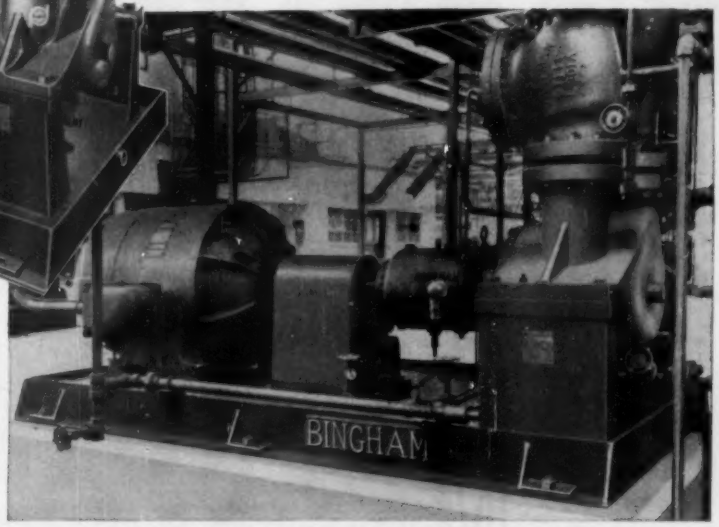
minimum NPSH requirements

Bingham Type CADS Pumps are available in sizes to meet a wide range of heads and capacities, with low NPSH conditions.



Bingham Type "CADS" Process Pumps feature unit-type bearing and rotating assembly which is easily removable for inspection and maintenance.



One of a battery of Bingham Type "CADS" Pumps in operation at Gulf Oil Co., refinery, Port Arthur, Texas.

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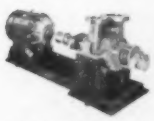
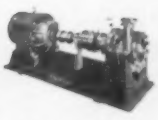
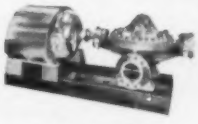


Bingham Type CD "Double Volute" Double Suction vertically-split case pump for hot service.



Bingham Type CJ "Double Volute" Two-Stage Process Pump for high heads.



Bingham Type HSB "Double Volute" Double Suction Pump for high heads.

Bingham Type MSB Horizontally Split-Case "Double Volute" Multi-Stage Pump for high pressure hot or cold service.

Bingham Type KT Stuffing-boxless Pump for high suction pressures and cold service.

Bingham Type VCP Vertical Pump for low NPSH conditions, featuring bottom dismantling.

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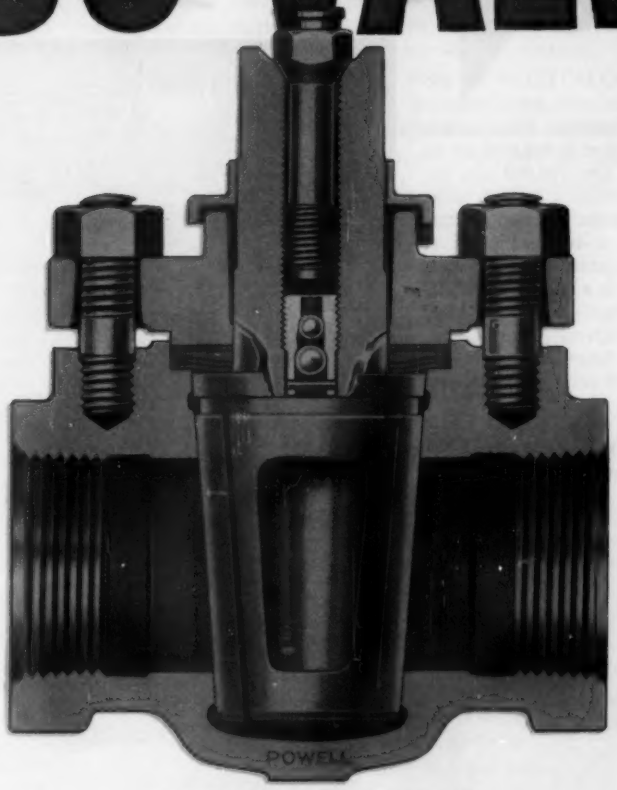

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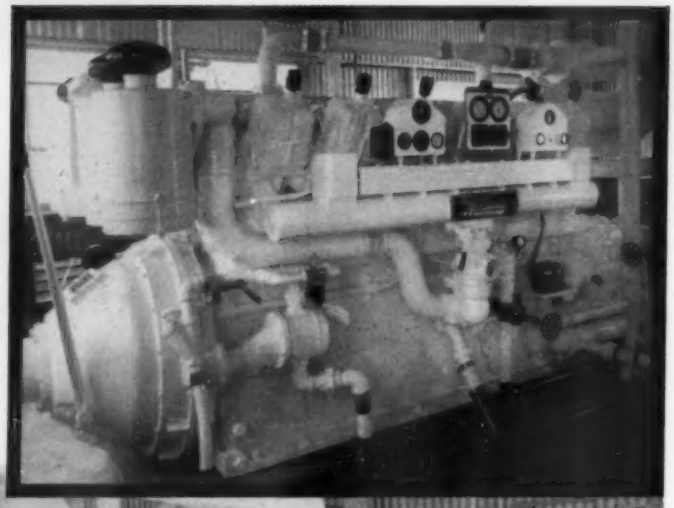

▶ At this station on the Mississippi River, super tankers are being loaded at what is believed to be the country's highest loading rate—40,000 bbl. per hour. Oil is pumped from 200′ diam. x 14′ high tanks through a 30″ line by two 3-stage Johnson vertical turbine pumps, each having a designed point of 17,500 bbl. per hr. at 196′ head. Driving each pump through Western gears, is a Model VLROBU Waukesha Gas Power Unit with a tremendously powerful, rugged 12-cylinder, high compression, overhead valve, 60-degree vee, four-cycle engine of 8½-inch bore and stroke, 5788 cubic inch displacement. Get Bulletin 1656.

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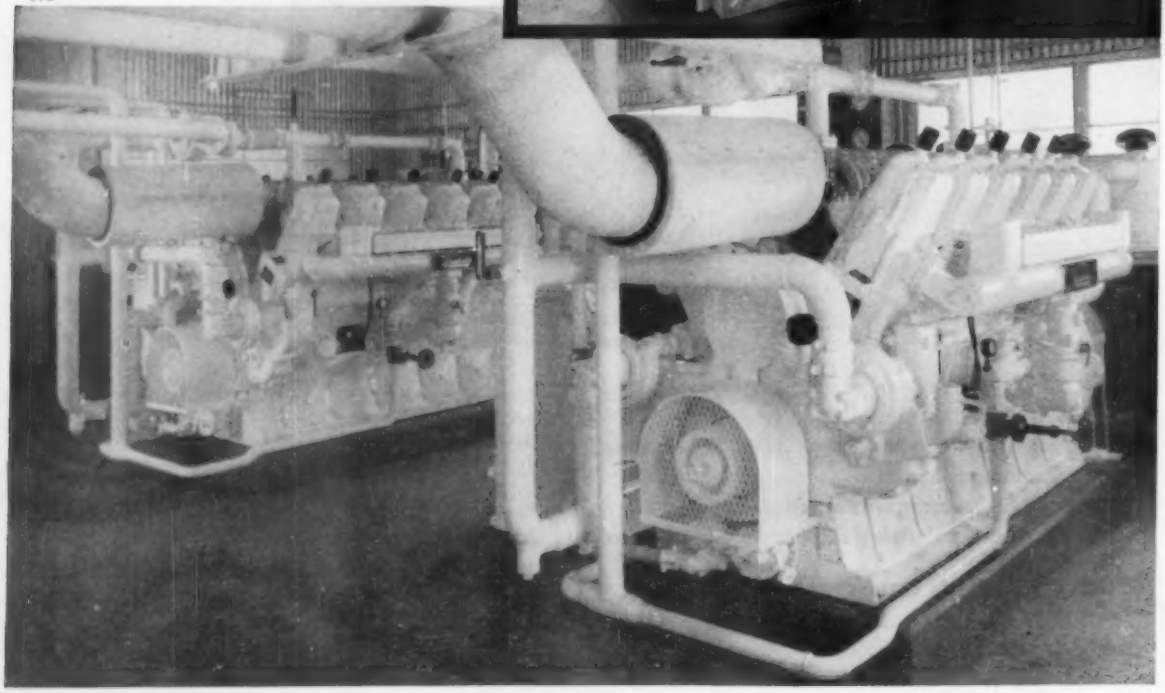

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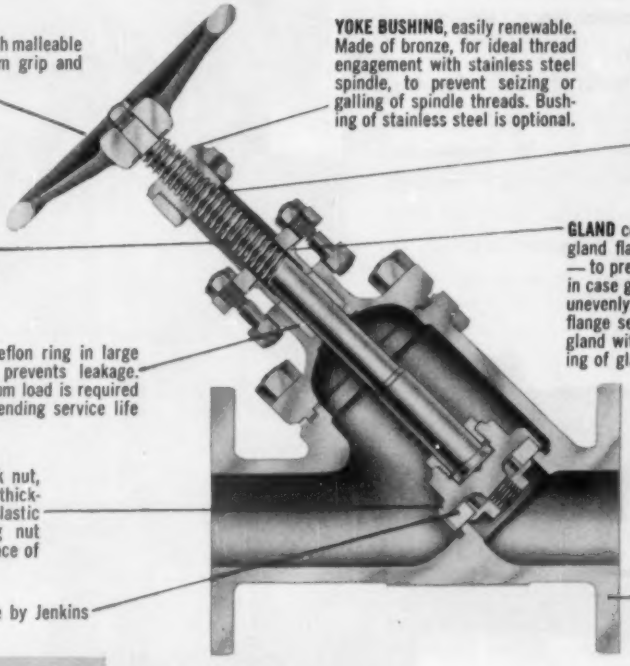

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DISC HOLDER, held by lock nut, has depth equal to disc thickness, preventing flow of plastic disc. Wide disc retaining nut covers all but seating surface of Teflon disc.

DISC is Teflon made by Jenkins

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YOKE BONNET, a single unit, has liberal space between yoke arms for easy access to packing box. Tongue and groove joint with body makes a pressure-tight seal with less tightening on the bolts, and eliminates possibility of blowing out the Teflon gasket.

GLAND consists of two pieces — gland flange and gland follower — to prevent binding of follower in case gland bolts are tightened unevenly. Crowned surface of flange secures tightness against gland without excessive tightening of gland nuts.

BODY Through-port design for full, free flow. Liberal seat height permits repeated refacing. Cast on body are directional arrow and bosses for drain connections. End flanges conform to M.S.S. specifications.

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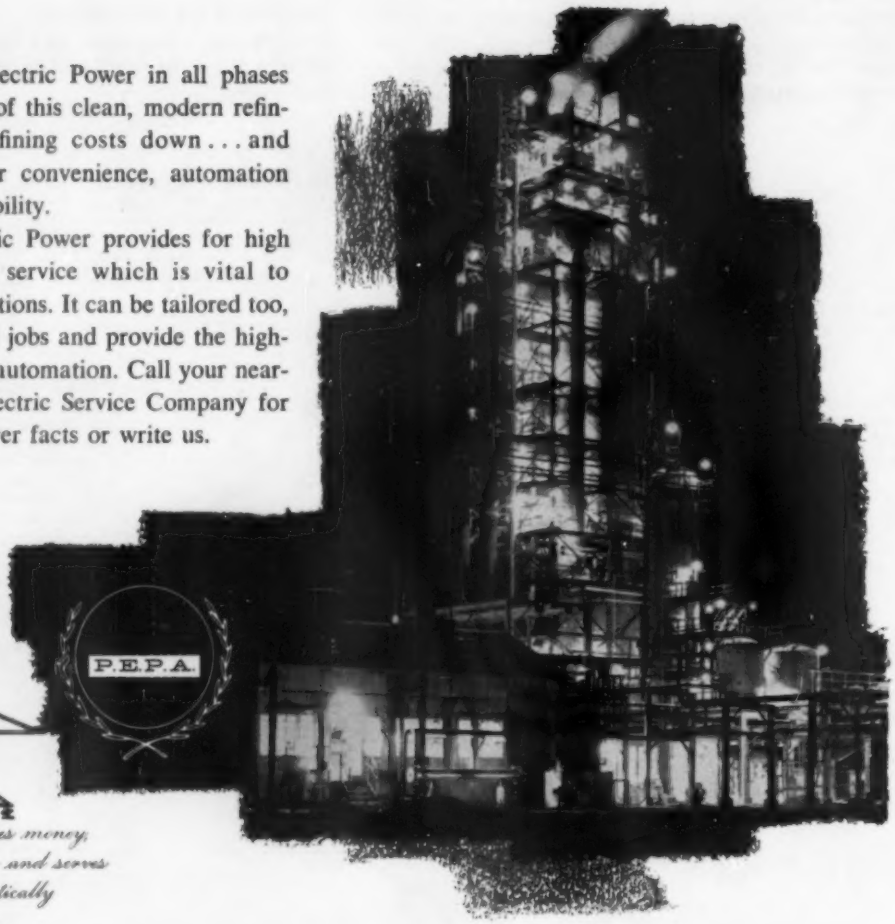

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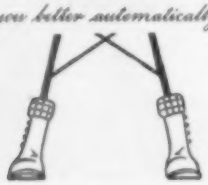

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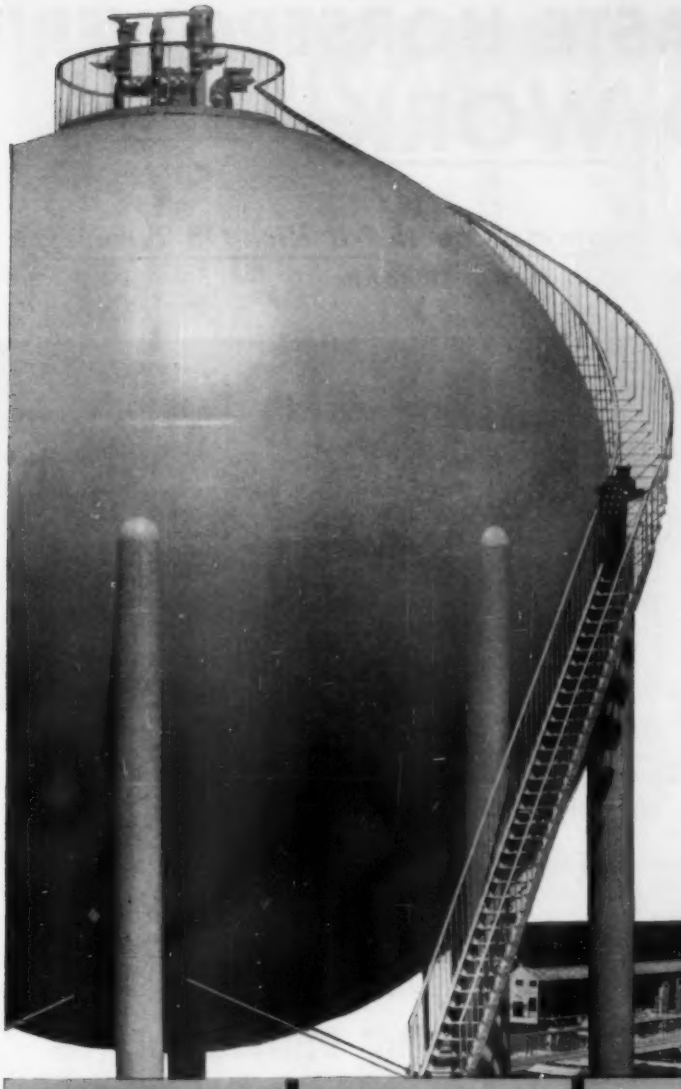

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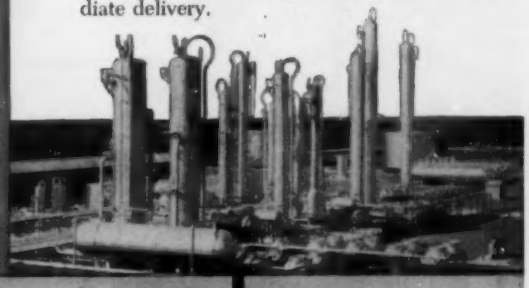

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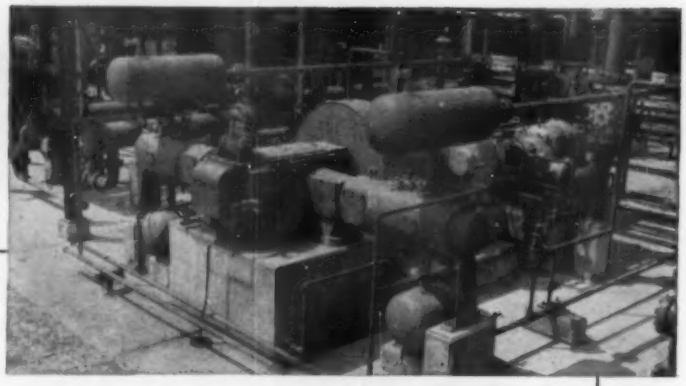
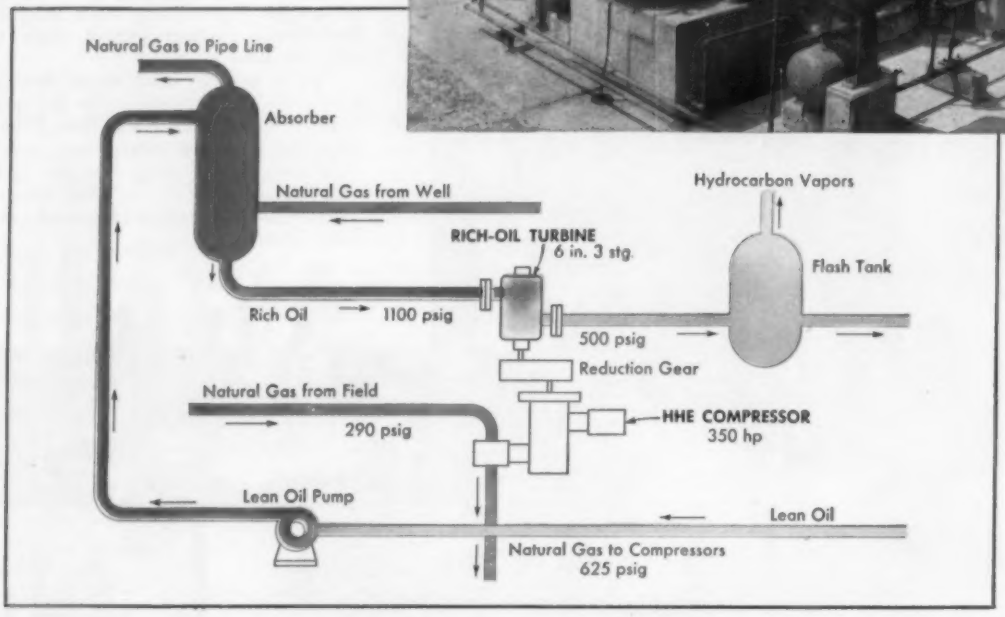
One of three Ingersoll-Rand HHE compressors driven by a 350-hp I-R 6-inch, 3-stage rich-oil turbine (shown at right) at the La Gloria natural gasoline plant.



Schematic flow diagram of the absorption cycle, simplified to show only one flashing stage. In this plant, three 350-hp turbines are installed between absorbers and high-pressure flash tanks, and two I-R 4-inch, 2-stage 150-hp turbines are located between high-pressure and low-pressure flash tanks.



In the absorption process for natural gasoline extraction, rich oil from the absorber must be reduced in pressure before going to the still. This pressure reduction is usually accomplished by a reducing valve that does no useful work. But by putting an I-R *rich-oil turbine* in place of the reducing valve, other equipment can be driven by the horsepower recovered in the pressure reduction process.

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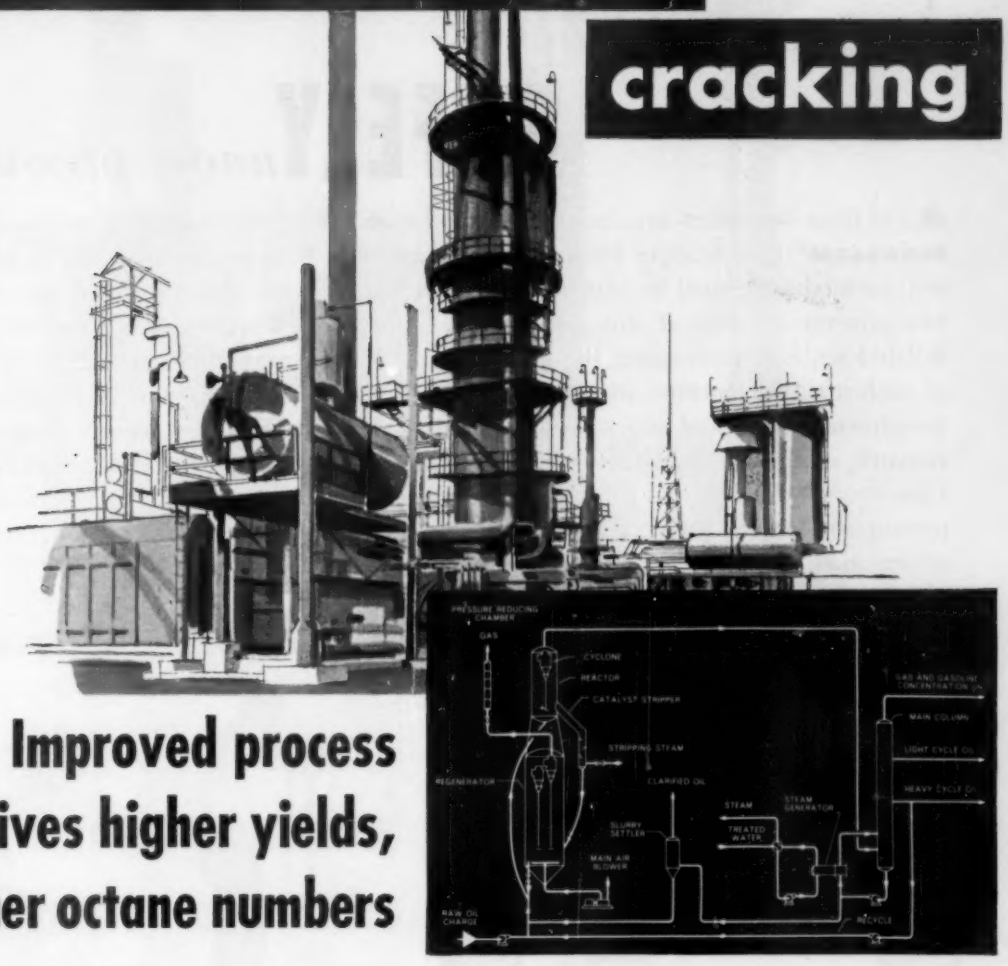
UOP fluid catalytic cracking



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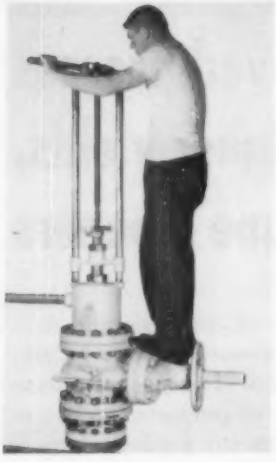
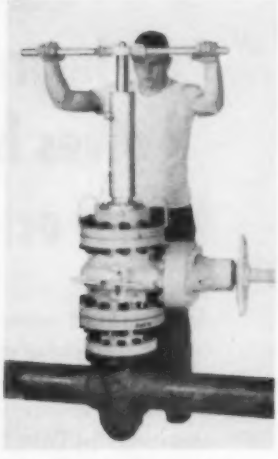
Step 2. Bolt Mueller Drilling Machine to valve. Cut-out sections of line to accomodate stopper. Remove drilling machine.



Step 3. Bolt stopping machines to valves. Connect by-pass. Stop-off line. Section of line now isolated—ready for repair, replacement or tie-in.



Step 4. Remove stopping machines and by-pass. Install completion plug in top of fitting with completion machine.

Step 5. Remove all equipment. Cap fittings.

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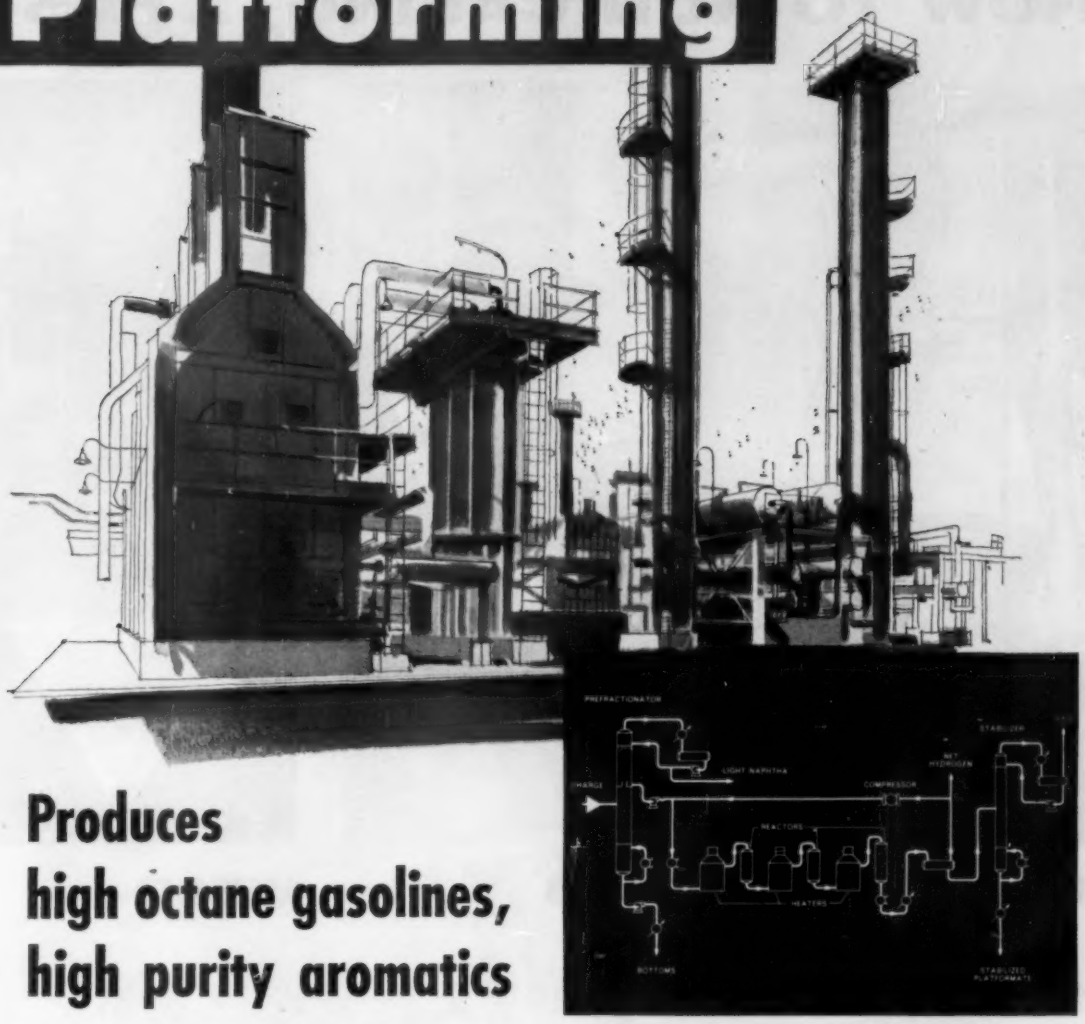

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No longer need low octane gasolines be a serious problem in refinery economics, thanks to the remarkably versatile refinery tool—UOP Platforming.

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As shown in the accompanying flow diagram, the Platformer is a compact unit consisting of a reactor section, stabilizer section, and (optional) feed preparation section. It can handle the full boiling range gasolines without prefractionation, or naphtha cuts separated from them, and efficiently processes any naphtha from crude distillation, natural gasoline plants or cracking units.

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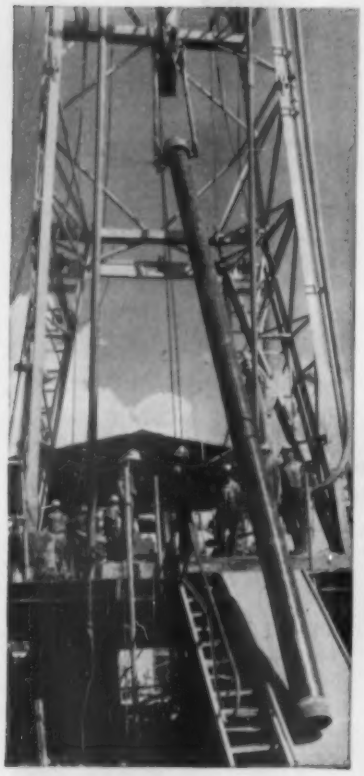

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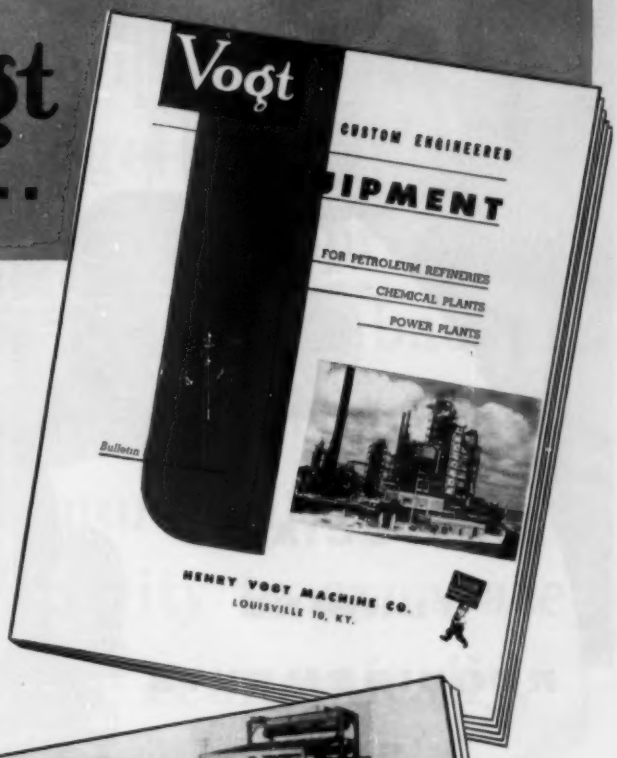

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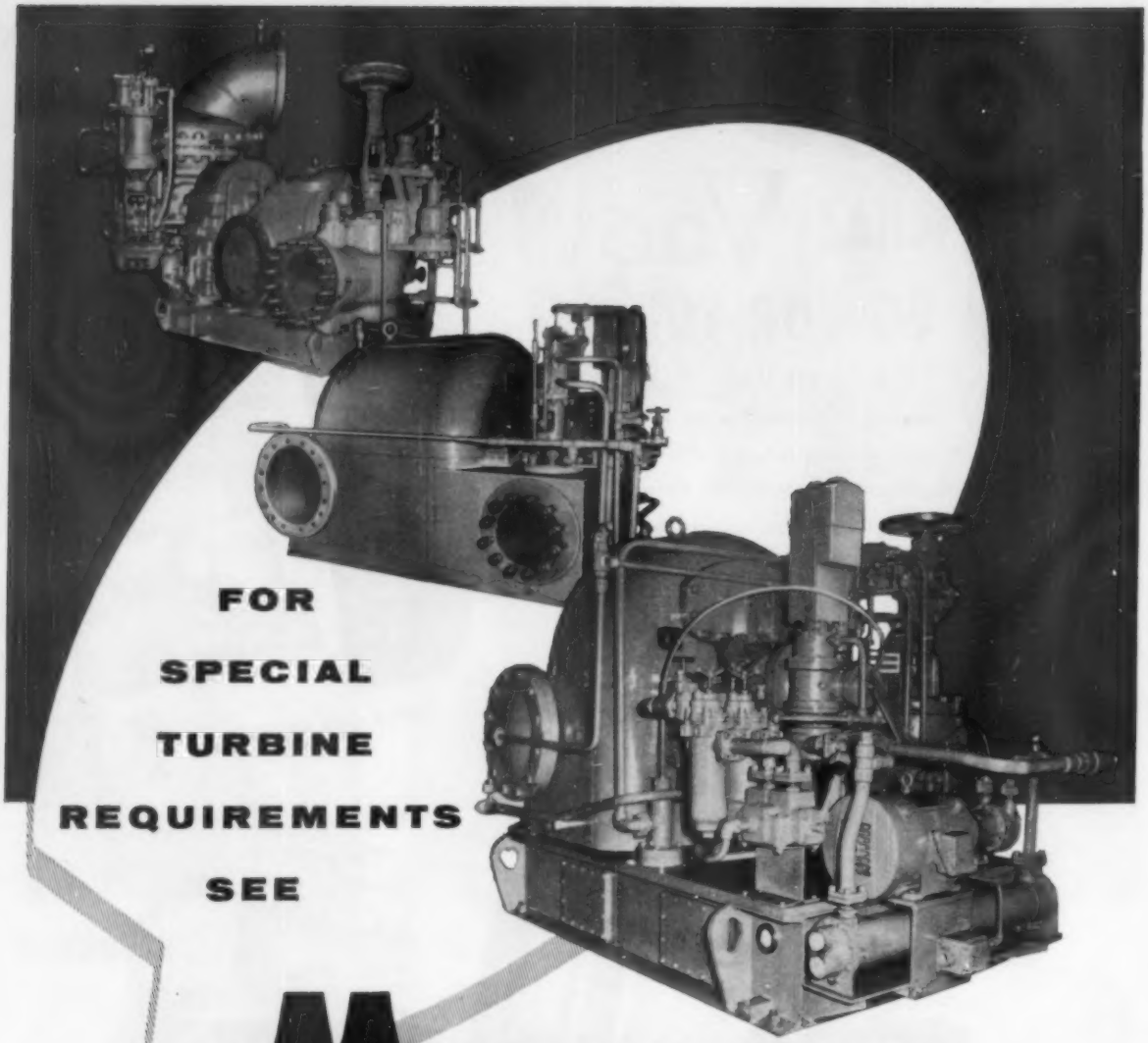

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Engineering Progress Report

FROM UNION CARBIDE CHEMICALS COMPANY

Side Stream Distillation Reduces Cost of Gas Sweetening Operations

Control monoethanolamine contamination by eliminating foreign materials

Monoethanolamine reacts with weak acids such as hydrogen sulfide and carbonic acid at ambient temperatures to form salts. Then, these salts decompose when heated to the boiling point of water, liberating the acidic gases and freeing the monoethanolamine for recirculation to pick up more acid gas. This provides an economic cyclic process for absorbing these undesirable materials from a gas stream. Because of this, practically all gas sweetening in the United States is accomplished by means of the ethanolamines. Union Carbide Chemicals Company's Technical Service Department is continually engaged in research designed to give better engineering service to users of CARBIDE's ethanolamines.

MOST UNITS ARE TROUBLE-FREE

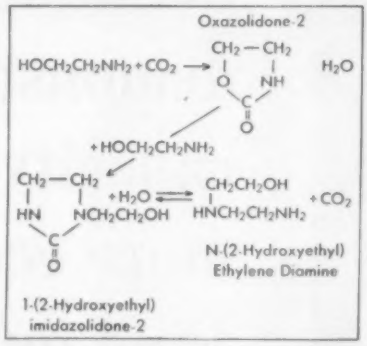
Most of these plants have operated for years without difficulty. However, experience with both aqueous-amine and glycol-amine solutions shows that in some plants the solution gradually loses capacity to absorb acidic gases and may become corrosive.

Research has shown that monoethanolamine contamination can be controlled by a simple side stream distillation system which removes foreign materials and amine degradation products. Thus, sewering can be avoided.

FORMATION OF AMINE DERIVATIVES

Examination of used aqueous and glycol-amine solutions led to the isolation and identification of two monoethanolamine conversion products, namely, 1-(2-hydroxyethyl) imidazolidone-2 and N-(2-hydroxyethyl) ethylene diamine.

It was found that this reaction actually takes place at a very slow rate in some plants handling carbon dioxide. A similar reaction



yielding similar products does not occur when only hydrogen sulfide is present.

EFFECT OF AMINE DERIVATIVES

Formation of imidazolidone reduces the effective monoethanolamine concentration and increases solution viscosity. High concentration may aggravate precipitation of residues in equipment. N-(2-hydroxyethyl) ethylene diamine will pick up acid gases, but release them only with difficulty. The acid gas salt of this stronger amine may contribute to plant equipment corrosion.

DEGRADATION PRODUCTS REMOVED BY SIDE STREAM DISTILLATION

Commercial experience proves that it is possible to remove the imidazolidone from fouled plant solutions by side stream distillation at atmospheric pressure. Batch-wise operation handling approximately 1 per cent of the circulated solution has been successful. Vacuum distillation equipment has been equally successful in the case of glycol-amine solutions.

While the substituted ethylene diamine can be efficiently removed in aqueous monoethanolamine systems, it can not be removed from diethylene glycol-monoethanolamine mixtures as its boiling point is within a few degrees of that of diethylene glycol.

However, the imidazolidone and diamine are in equilibrium. Therefore, reduction of the imidazolidone concentration causes the diamine to revert to imidazolidone. This results in an ultimate removal of both the imidazolidone and the diamine.

In addition, side stream distillation also removes inorganic salts, organic materials with boiling points higher than monoethanolamine, and heat stable monoethanolamine-acid reaction products.

TECHNICAL SERVICE AVAILABLE

CARBIDE offers many technical services to the gas conditioning industry. If you have a gas treating problem, call the nearest CARBIDE technical representative or write Union Carbide Chemicals Company, Department B, 30 East 42nd Street, New York 17, New York.

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Selecting A Motor Drive For A Hazardous Area?

Here's how

TEIGF motors

by E-M

provide safe, dependable, economical power

Faced with the problem of driving hydrogen compressors in atmospheres which might contain hydrocarbons at their Baltimore refinery, engineers of Esso Standard Oil Company turned to TEIGF (Totally Enclosed Inert Gas Filled) Motors. Horsepower requirements exceeded the practicable limits under which explosion-proof motors could be used.

An important consideration was getting the greatest possible drive economy while operating safely in a possible hydrogen atmosphere. Three E-M 350 hp, 390 rpm TEIGF Motors are on duty at Esso Standard Oil Company fulfilling these important qualifications.

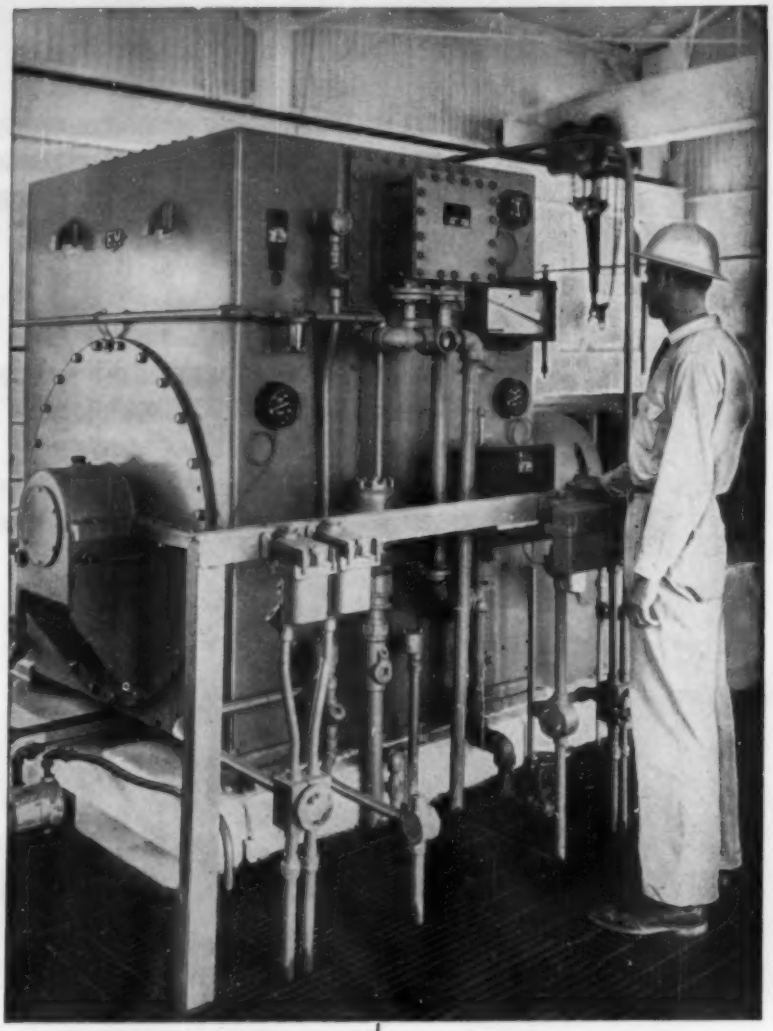
For Esso Standard Oil Company and other companies with similar problems, these E-M Motors offer three main groups of advantages:

1. SAFETY — Within the motor enclosure, inert gas pressure above atmospheric keeps explosive hydrogen out. A series of features help accomplish complete safety . . . inert gas pressure gauges . . . temperature gauges . . . purging valves, etc. and a full line of optional equipment. The E-M TEIGF Motor can be "customized" to meet your needs exactly.

2. RUGGED DEPENDABILITY. E-M uses specially designed "box type" frames of heavy-duty plate steel reinforced with heavy bar-stock ribs. They cannot twist or distort. Air gap is accurate and permanent, as all frame welding is completed before precision boring. Ventilating gas passages are carefully engineered to provide unimpeded gas flow for optimum cooling.

3. ECONOMICAL OPERATION. In E-M TEIGF Motors, gas loss is lower than commercially accepted standards. Specially designed shaft seals are oil-pressure gas-sealed bearing type, virtually non-wearing. Where bolts enter outside casing, E-M engineers specify blind holes . . . tapping and drilling are done *into* casing, not through. Operating and maintenance costs are at a minimum.

Consult your nearest E-M sales engineer, or write the factory for TEIGF Motor Bulletin No. 226.



TYPICAL STANDARD FEATURES INCLUDE:

1. Top-mounted gas-to-water cooler for use with suitable cooling water supply.
2. Forced-feed lubricated bearings and oil-pressure gas seals.
3. Oil pump, motor and oil filter. (Can be supplied optionally inside enclosure.)
4. Inert-gas temperature gauge.
5. Inert-gas pressure gauge.

(additional features shown in Bulletin No. 226)

TYPICAL OPTIONAL FEATURES INCLUDE:

1. Water cooler with double-tube construction for added protection against leakage.
2. Liquid level detector switch. Accumulation of moisture within motor sounds alarm or shuts down motor.
3. Bearing temperature relays, to sound alarm or shut down motor.
4. Explosion-proof motor terminal pothead or inert-gas filled terminal box.
5. Water flow indicator. Can be adapted for use with pneumatic-type regulating device.

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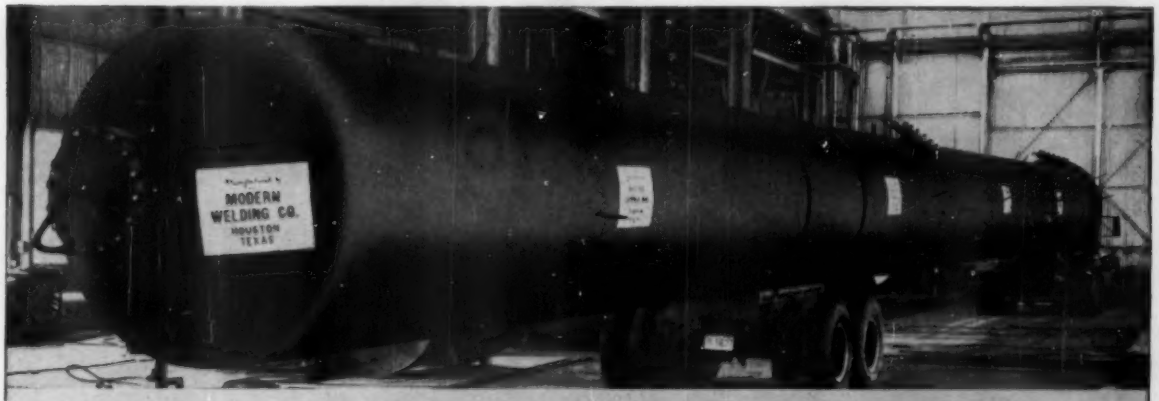
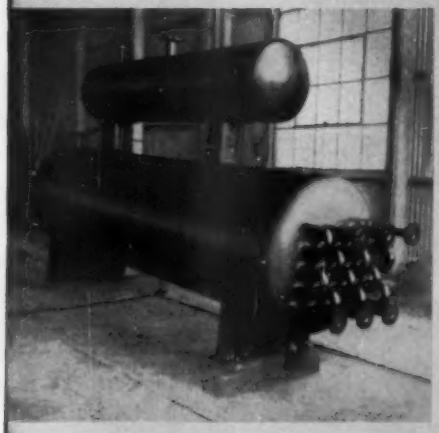


Fractionating Column—72" Dia. X 110'-0" length, ¾" wall thickness with 40 trays. All welds 100% X-ray quality. Constructed for internal pressure and full vacuum. Stamped A.S.M.E. Code. Total weight 83,000 lbs.



Heat Exchanger — Lower Section 4'-0" dia. X 14'-0". Upper Section 1'-8" dia. X 10'-0", ⅝" Carbon Steel Plate Wall. A.S.M.E. Code construction using tube bundle of schedule 160 pipe.

Styrene Stripping Column—9'-6" Dia. X 80'-0" length, ½" plate walls and ⅝" heads. Constructed and stamped A.S.M.E. Code. Vessel contains 14 stainless steel perforated trays, 16 manways, 146 couplings, and nozzles. Total weight 72,000 lbs.

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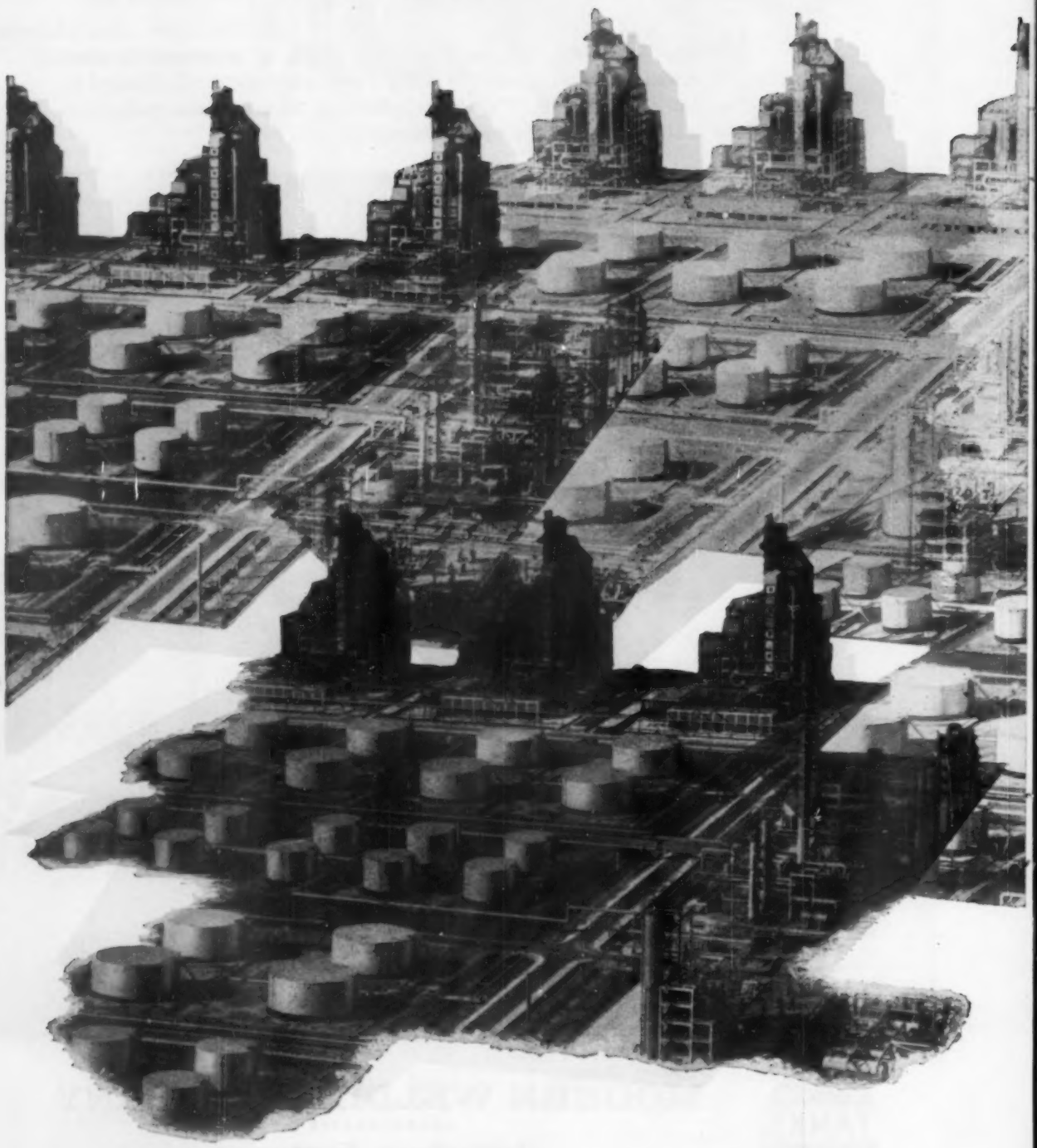
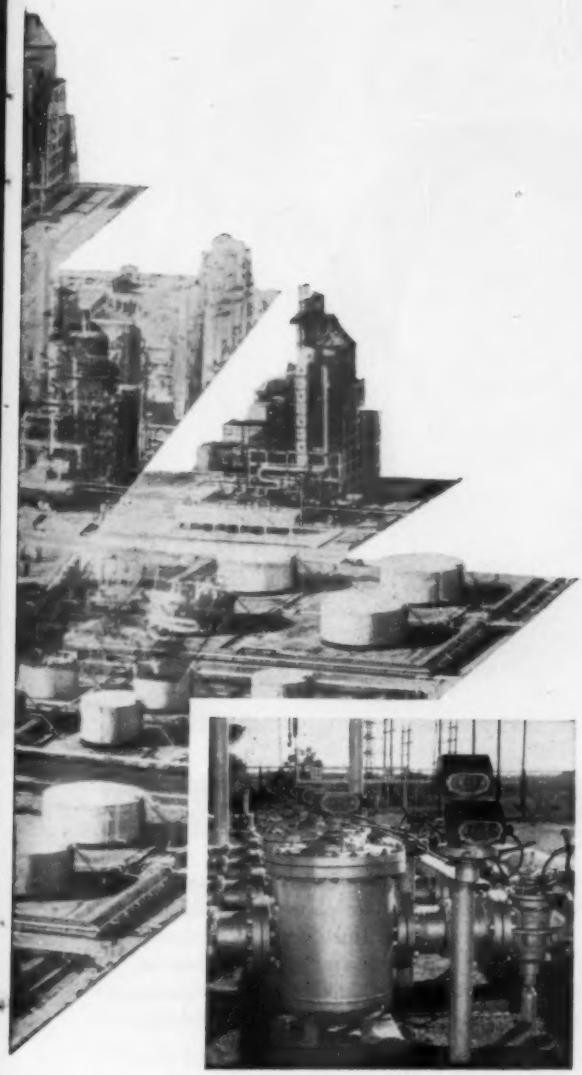


meter systems"-

newest way to refinery expansion without buying real estate



With individual capacities ranging up to 2000 bph, these four A. O. Smith B-200 meters receive crude from a 16-inch line. Meters are connected by combinator units that register total throughout on counter-shifter ticket printer (foreground).

The road to expansion of refining facilities is frequently strewn with barriers — local zoning restrictions, expensive real estate or lack of available adjoining land.

To avert these drawbacks, more and more major pipeliners and refiners are turning to A. O. Smith engineered meter installations. Large volume A. O. Smith meters release measurement tankage for storage purposes . . . provide faster, less complicated throughput . . . reduce overall capital investment . . . slash tank filling and breathing losses.

Equally important, A. O. Smith engineered meter systems provide exceptionally accurate measurement of all transactions.

Before you plan tank-farm expansion you'll be money ahead to consult A. O. Smith. There are meters and accessories for every receiving line — crude, LPG or natural gasoline . . . models for a wide range of operating pressures. And, A. O. Smith meters are equally accurate in measuring finished petroleum products . . . offer similar space saving advantages. Contact your man from A. O. Smith today or write direct:

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Ashcroft Duragauge in Phenol case — a tough, rigid plastic turret type case for wall or flush mounting.

The Bourdon tube in Ashcroft Duragauges is machined mirror-smooth inside and finish ground outside to exact tolerances. Strong, uniformly thick walls assure precise flexibility—sustained high accuracy and long life.

Eight tube materials permit you to select the best metal with sensitivity balanced by internal corrosion resistance. Whether your choice is phosphor bronze, an alloy steel, "K" Monel, a stainless steel or beryllium copper, metallurgical control is exact from ingot to finished tube. Socket and tip joints are welded or brazed, then stress relieved for highest strength and safety. "Whip testing" at pulsating pressures at least 50% greater than rated pressure insures calibration stability.

Order your Ashcroft Duragauges with the best Bourdon tube material for your service. Choose the all-stainless-steel movement or stainless steel with nylon bearings and pinion gear. Full range of pressures, dial sizes, case designs and materials available. In any combination of components, Duragauges give sustained high accuracy and long service. Get details from your industrial supply distributor.

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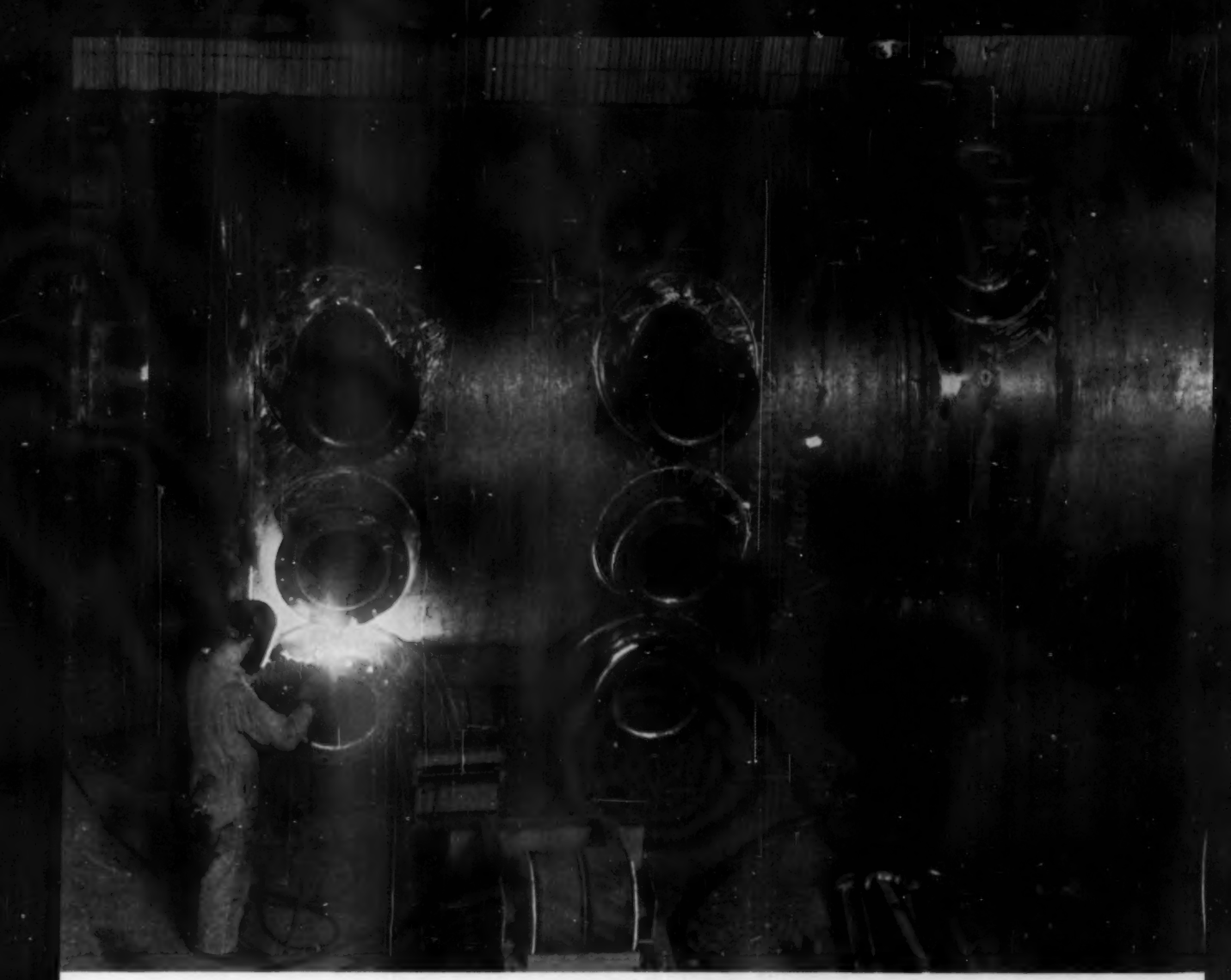

The Business End of a Big New Vessel for DOW Petrochemicals

An expanding petrochemical plant at The Dow Chemical Company in Bay City, Michigan called for an interesting two-part processing unit—a quench water tower and a quench water tank. Designed by Bechtel for the new plant now under construction by The Austin Company, this unit was awarded to Graver for fabrication.

This petrochemical unit for Dow is one of many types of both shop-built and field-erected processing equipment which Graver fabricates for the growing petrochemical, chemical and petroleum industries. In Graver's century of experience you will find the most modern fabricating and research techniques for the processing equipment you require.

Fabricated from ASTM A-285 GC Fire Box Quality Steel in accordance with ASME code standards, the tower was shop-built and the tank field-erected. The tower was constructed to withstand a design pressure of 15 psig, the tank, 3 psig. The design temperature provided for by the tower is 650°, by the tank, 200°. All welding was spot radiographed. Before leaving the shop, the tower was sandblasted and painted with one coat of lead chromate primer.

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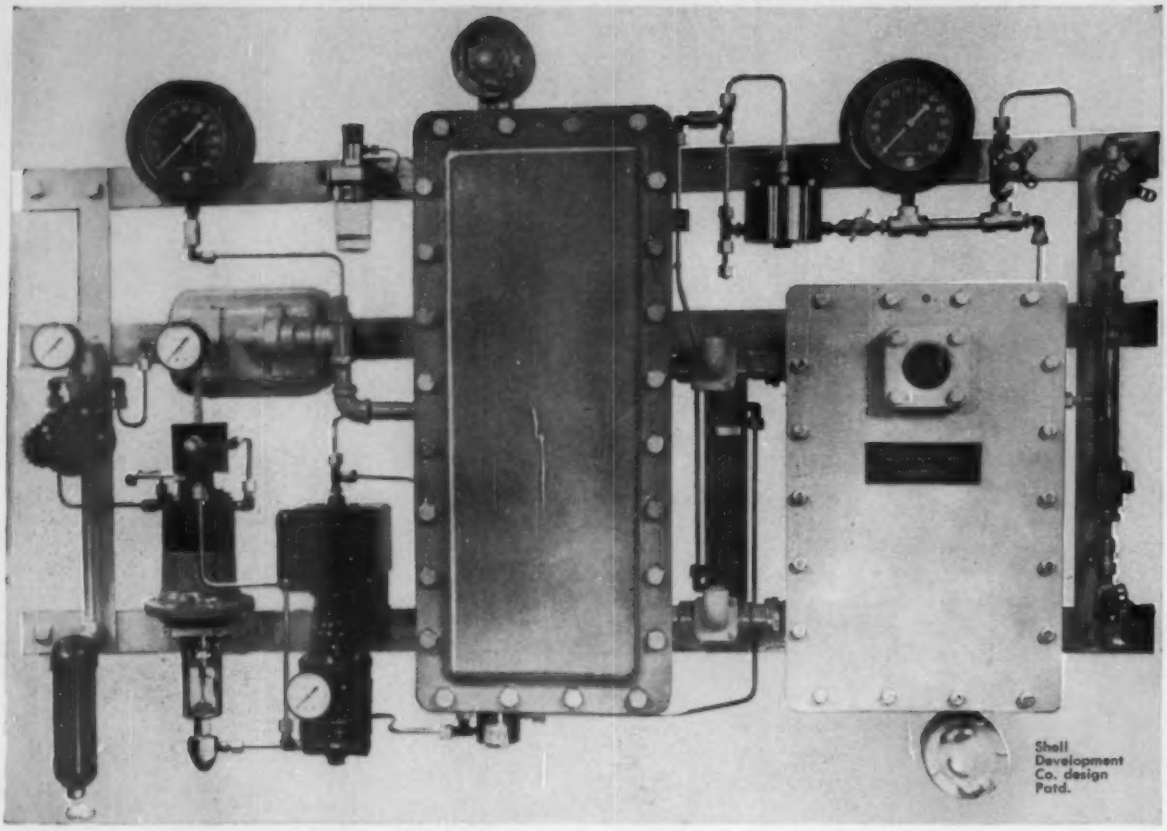

This Continuous Vapor-Pressure Recorder PAYS OUT in one to three months

It continuously samples and records the vapor pressure of gasoline or liquefied gases in a flowing stream.

Elimination of laboratory tests alone pays the whole cost of the Continuous Vapor-Pressure Recorder installation in as little as one month. After that, the savings show up in economy in production.

This instrument is simple, reliable, and needs but occasional maintenance.

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Sulfuric Acid Analyzer (for Alkylation Plants) continuously samples an alkylation acid stream and measures acid strength. Saves as much as $400 a day on replacement acid.

*Color Alarm** provides an alarm or visual signal when color limit is exceeded.

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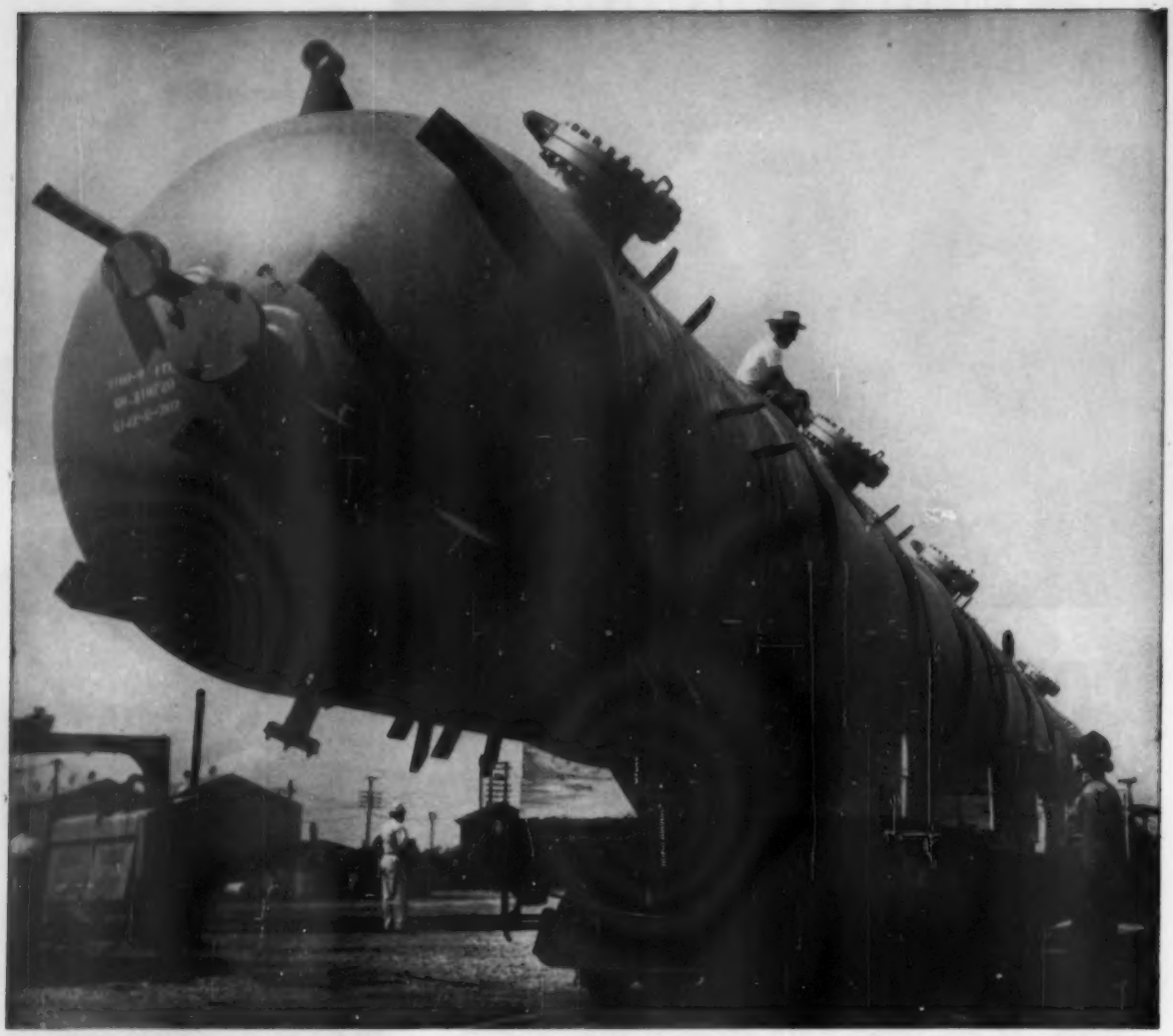

THIS ENTIRE VESSEL was radiographed. Built for use by Socony Mobil Oil Company, Incorporated, it was stress relieved in thirds, and the two joints were stress relieved locally. The unit contains 30 uniflex trays of 96" diameter. Overall weight: 152,000 lbs.

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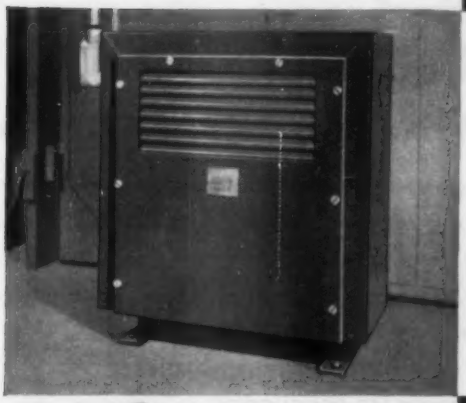

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These new quiet-type transformers are compact, light in weight, provide a flexible, modern power system to change higher voltage distribution service to lower voltage lighting and power circuits. They meet all safety requirements for indoor installation.

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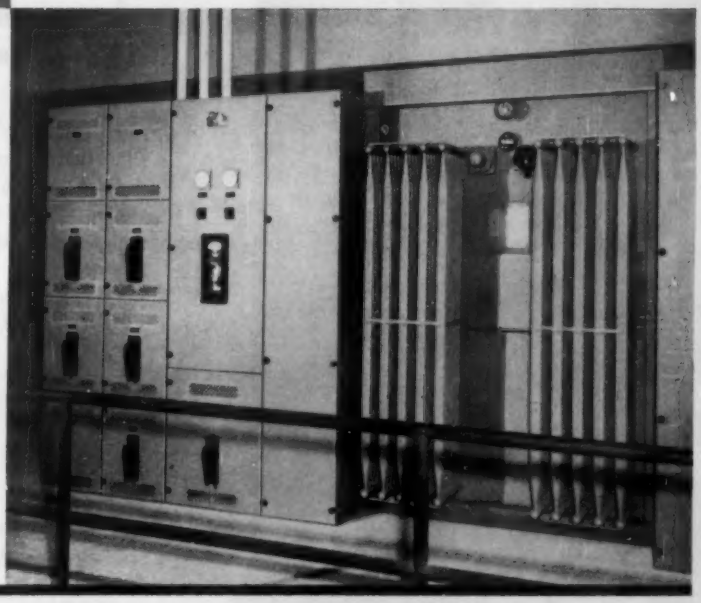
Bulletins TU-205 and TU-214 give full information on Wagner Load-Center Transformers. Write today.

WT59-2



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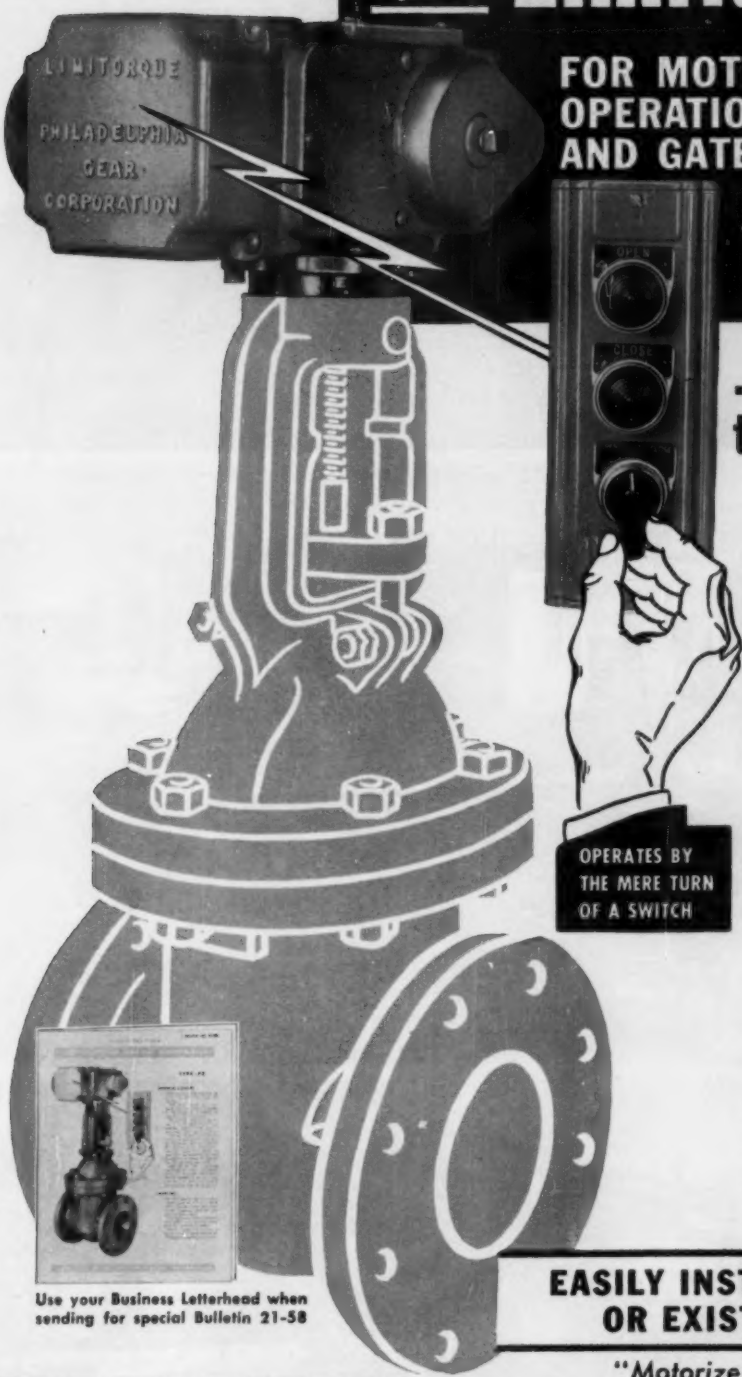
TYPE P-2

FOR MOTORIZED AUTOMATIC OPERATION OF SMALL GLOBE AND GATE VALVES

. . . Economically and Efficiently



. . . truly a dependable time and money saver

Here is a new, compact, economical and dependable LimiTorque Motorized Operator for use on small (normally hand-operated) Globe and Gate Valves — either new or already in service. Your existing hand-operated valves can now be easily motorized by the removal of the hand-wheel, and mounting the P-2 Unit on the same bonnet . . . the Unit output drive sleeve will then drive the hand-wheel unit, which arrangement is suitable for both rising and non-rising stem valves.

The P-2 LimiTorque Operator has a standard out-put speed of 22.5 or 45 rpm, which covers the average and recommended operating speed for most Globe and Gate Valves.

Remember, this new P-2 LimiTorque is built by the largest manufacturer of Motor Operators for Valves in the World . . . backed by nearly 30 years experience.

BE CONVINCED how the P-2 can save you time, labor and money in the operation of small valves — just write for Bulletin No. 21-58, which not only illustrates and explains its operation, but shows how easily it can be installed on existing or new valves.

Contact your Valve Manufacturer, or your nearest LimiTorque Sales Engineering Office.

Use your Business Letterhead when sending for special Bulletin 21-58

EASILY INSTALLED ON NEW OR EXISTING VALVES

"Motorize to Economize"

THERE IS NO SUBSTITUTE FOR —

LimiTorque®

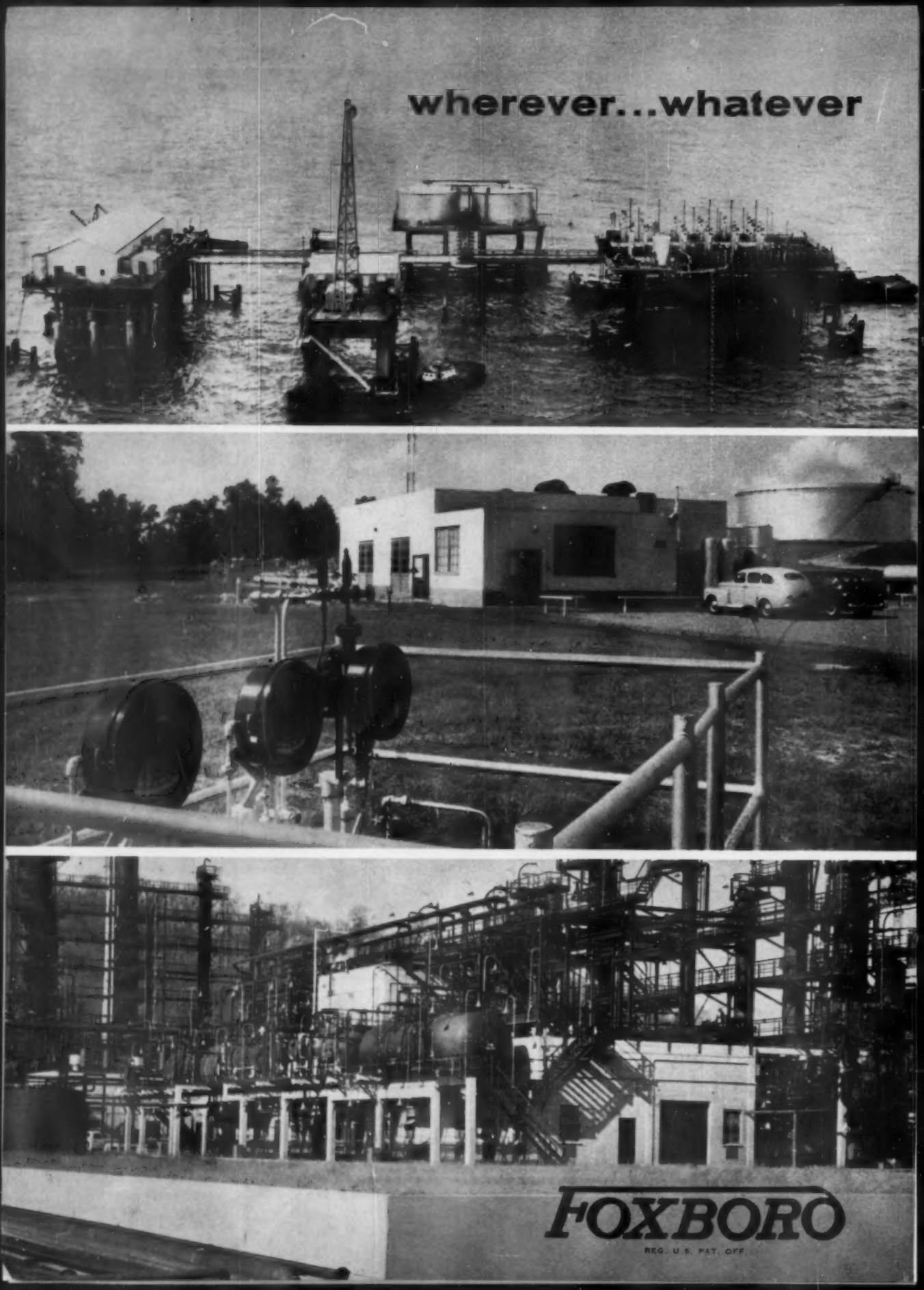
PHILADELPHIA GEAR CORPORATION

ERIE AVE. & G STREET, PHILADELPHIA 34, PENNA.

Offices in all Principal Cities

INDUSTRIAL GEARS & SPEED REDUCERS • LIMITORQUE VALVE CONTROLS • FLUID AGITATORS • FLEXIBLE COUPLINGS

Limitorque Corporation • Philadelphia


wherever...whatever
FOXBORO
REG. U.S. PAT. OFF.

your flow problem

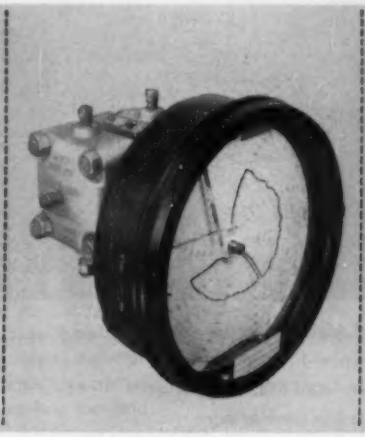
FOXBORO HAS A BETTER INSTRUMENT FOR IT

Liquid, vapor, gas, or slurry—there's a Foxboro instrument to meter the flow of any fluid in any oil and gas process. From the simplest general utility meter, to complex automatic ratio control systems, Foxboro offers the greatest variety of flow measurement and control equipment, assuring you of the right instrument for every flow problem.

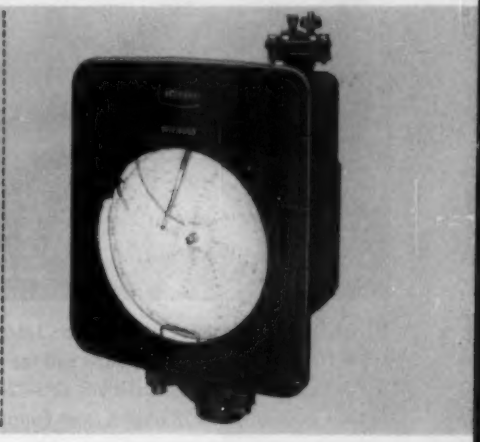
Foxboro meters include superior accuracy, "cashregister" flow recorders; portable types for field checking; transmitters for long-distance, centralized control; as well as specially designed flow systems for even the most unusual needs.

A few of these meters are described below. For complete information on these, or any meter in Foxboro's complete line of flow instrumentation, get in touch with your nearby Foxboro Field Engineer. Or write **The Foxboro Company, 363 Neponset Ave, Foxboro, Mass.**

d/p CELL FLOW TRANSMITTER. Provides high sustained accuracy with positive overrange protection—complete line includes both pneumatic and tubeless electronic transmitters.



DIAPHRAGM METER. Uses no mercury—inherently linear, with NO zero drift. Round and rectangular cases. Available also as pneumatic or tubeless electronic transmitter.

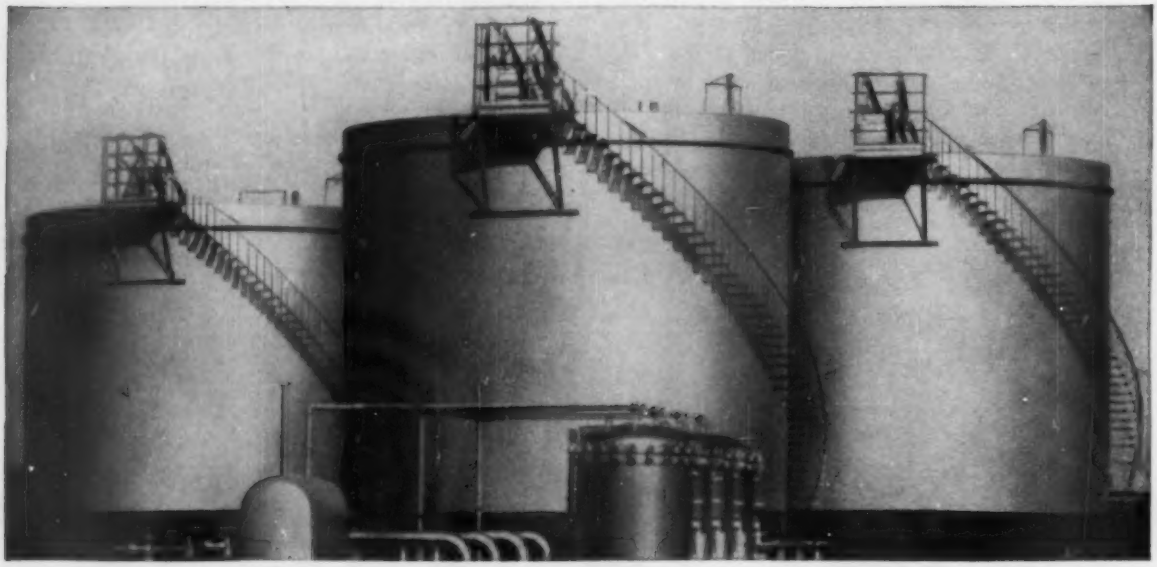


MERCURY METER. Wide variety of types. Type 28 Meter, shown above, is ideal for gas flow metering. It has the longest float travel and the most power of any commercial meter made.

OTHER FOXBORO FLOW INSTRUMENTATION: Magnetic Flow Meters • Panel-, field-, and valve-mounted flow controllers • Electric, Pneumatic, and Mechanical Integrators • Planimeters • All primary elements, valves, and accessories required for complete flow measurement and control systems.

FIRST IN *FLOW*

HAMMOND TUBESEALS* USHER IN *THE JET AGE*



FUELING THE PURE JETS at the International Airport, New York took special equipment and the know-how gained in fueling Viscounts and Britanias, says Petroleum Marketer in their November 1958 issue... also featured in their article about this pure jet installation is the equipment used... ***"ALL ABOVE GRADE TANKS ARE HAMMOND TUBESEAL FLOATING ROOF TYPE"***... this terminal is owned by the Port of New York Authority and is operated by Allied New York Service, Inc.

Tubeseal Floating Roofs were selected for this and hundreds of other installations all over the world for the very characteristics of their design and construction: no vapor space between seal and product—no moving parts—climate proof—noncorrodible—protects product from rim and lightning fires—operates from top to bottom of tank—entire circumference tightly sealed under pressure at all times.

For storing jet fuels, gasolines, sour crudes, light crudes, alcohol, naphthas, polyester or similar products, the Hammond Tubeseal System is the most efficient and positive seal known.

** Tubeseal system*

James P. O'Donnell Consulting Engineer

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HAMMOND IRON WORKS

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PROVO, UTAH • CASPER, WYO. • BIRMINGHAM, ALA.

Service for PETRO-CHEMICALS from... ALLIS-CHALMERS

A local call

brings service to any branch plant

Your branch plants — no matter where they are located — are only a phone call away from Allis-Chalmers service.

To provide this guarantee of prompt service on mechanical and electrical equipment, A-C offers its petro-chemical customers a whole mapful of personnel and facilities. They include:

- **12 Regional Offices** — to serve as coordination centers from coast to coast.
- **79 Local Offices** — covering every industrial area in the country.
- **Field and Erection Personnel** — located strategically for 'round-the-clock' duty.
- **Certified Service Shops** — a vast network to provide minutes-away service.
- **Warehouse Stocks** — there's no waiting anywhere for replacement parts and components.

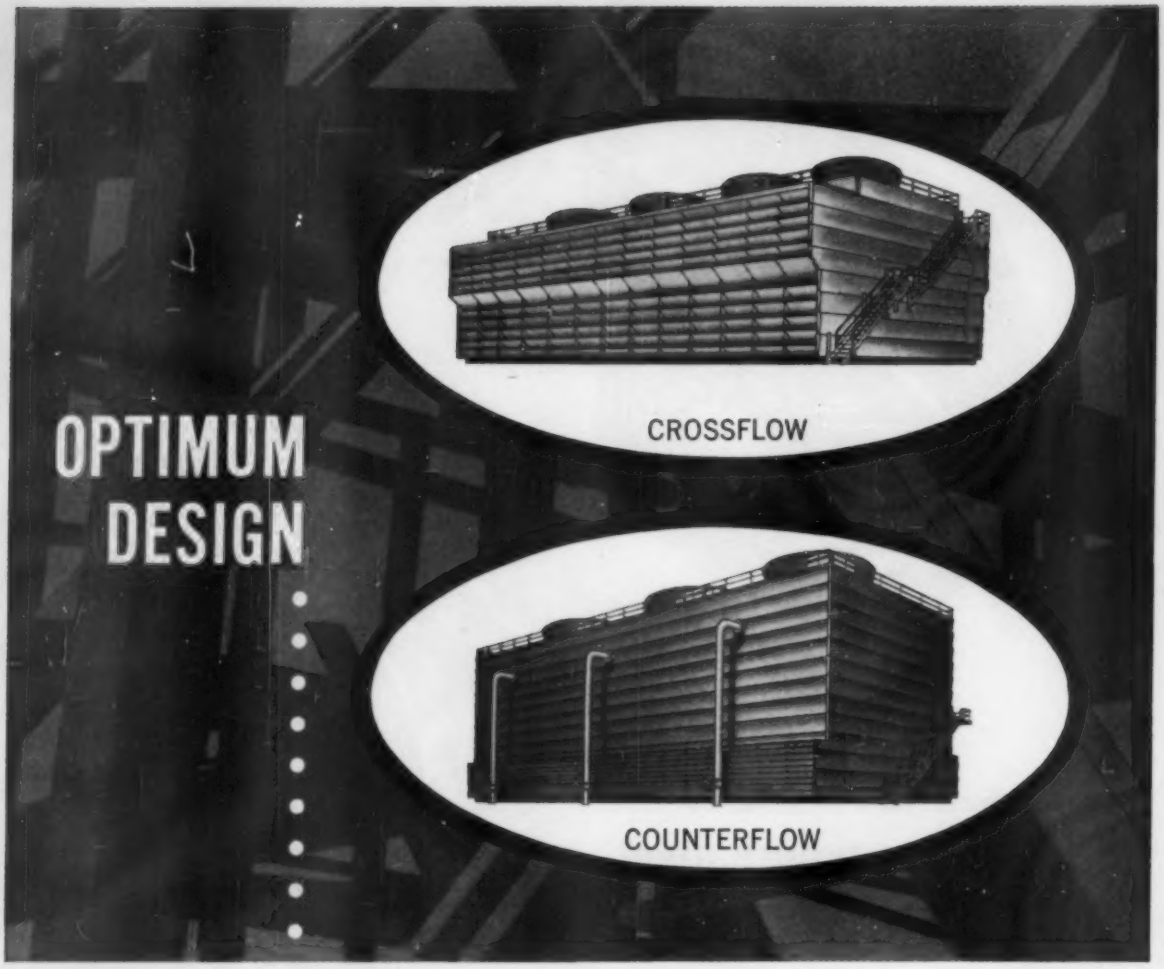
Matching this service is a tremendous scope of industry-designed equipment from one source. Ask your A-C representative about the last word in product designs, all proven by research and application, all built for outstanding quality control. Or write Allis-Chalmers, Milwaukee 1, Wisconsin.

Products for Petro-Chemicals: Electrical Generation, Distribution and Utilization Equipment; Pumps, Motors and Control; *Texrope* Drive Equipment; Processing Machinery (mills, kilns, screens, etc.); Water Conditioning Systems, plus Materials Handling Equipment.

A-5953

Texrope is an Allis-Chalmers trademark.

A-C ALLIS-CHALMERS



produces important savings in

COOLING TOWERS

Optimum designing of a cooling tower economically balances universally available substances—wood, air and water—into the most effective combination for achieving the results desired.

Basic to this is complete familiarity with the distinctly different fields of application of the two types of towers—CROSSFLOW and COUNTERFLOW—plus the ability to analyze process requirements impartially and objectively.

Slough-De Flon is the only designer and manufacturer of a complete line of industrial cooling towers to offer both types.

To learn more about optimum design—and for a discussion of the fields of application of the two types of towers, write for a free copy of our new brochure, "Cooling Tower Versatility." There is no obligation.

S/D

SLOUGH-DeFLON

COOLING TOWER ENGINEERS

2445 HUNTINGTON DRIVE, SAN MARINO, CALIFORNIA

REPRESENTATIVES IN ALL MAJOR AREAS

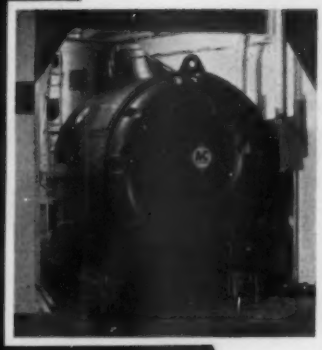
SCOPE in
MOTOR DESIGN from...

ALLIS-CHALMERS

The motor with coils that can be

Hi-potted Under Water

Remarkable insulating systems combined with advanced mechanical features are the story behind the *Super-Seal* motor. You get complete protection from moisture, chemicals and other contaminants, even with so-called drip-proof motor enclosures.



New motor is protected with *Silco-Flex* stator coil insulating system: A homogeneous dielectric barrier of vulcanized silicone rubber so moisture-proof it can be hi-potted under water . . . cleaned by hosing down. Resists most corrosive or chemical atmospheres.

Integrated field coils in synchronous machines are completely sealed against contaminants, bonded and locked against mechanical forces.

For additional information, call your nearby A-C office or write Allis-Chalmers, Power Equipment Division, Milwaukee 1, Wisconsin.

Super-Seal and Silco-Flex are Allis-Chalmers trademarks.

Here's high-potential test of *Silco-Flex* coils under water, with test voltage applied for one minute between conductor and water bath.

A-C ALLIS-CHALMERS

A-5949-P

—Photo courtesy Standard Oil Company (N.J.)

How preheat makes a "30-hour day"

When you add a Ljungstrom® Air Preheater, your on-stream stills can give 30 hours of normal production in every 24 hours. That's more than an extra week of production every month!

The reason is that Ljungstroms recover valuable BTUs that are normally dissipated up the stack. By putting this heat back to work, higher flame temperatures are generated, heat transfer rates increased. You can save one barrel of fuel in every five, stay on-stream months longer because slag is virtually eliminated.

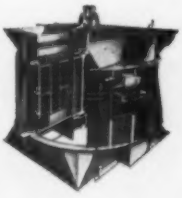
LJUNGSTROMS ARE WRITTEN OFF FAST

A Ljungstrom can pay out in nine months or less! The many other advantages show why: use of fuels you formerly threw away . . . more economical furnace design with no need for convection surfaces . . . minimum slag . . . shorter turn-around time . . . higher quality product (averaging 2 octane numbers higher than previously).

Detailed information is available. Learn about Ljungstrom's compactness, easy inspection, simplified cleaning, minimum maintenance, and the amazing economy and reliability story. Just call or write the Air Preheater Corporation.

Wherever You Burn Fuel, You Need Ljungstrom

The Ljungstrom operates on the continuous regenerative counterflow principle. The heat transfer surfaces in the rotor act as heat accumulators. As the rotor revolves, the heat is transferred from the waste gases to the incoming cold air.



The Air Preheater Corporation 60 East 42nd Street, New York 17, N. Y.

They Say—

Anyone have a longer one?

Dear Sir:

I have read with interest of the "post-hole" open-hole records of Texas, Oklahoma, and Canada. While these areas might occasionally out talk us, they haven't "out-open-holed" us.

General Petroleum Corp. abandoned their Edwards No. 1 May 8, 1955, at a total depth of 16,075 ft. They had 1,044 ft. of 13⅜-in cemented in the hole, thus leaving an open hole of 15,031 ft.

Justin S. Snow
Oil Land Development
Los Angeles.

(Editor's note: This long California hole still falls short of the record on file here—Phillips Petroleum Co.'s 1 Sublette in Sublette County, Wyoming, with 16,002 ft. of open hole (OGJ, No. 24, p. 31). The Edwards is the second longest claim. Husky Oil Co.'s 1 McCulloch Peak Unit, Park County, Wyoming, is third with 14,604 ft.)

Navy's Alaskan operations

Dear Sir:

It is seldom that I write a letter to an editor, but an article in your publication contains a couple of distorted facts which should be corrected for the record.

The article to which I refer appears on page 74 of your March 2 issue ("Alaskan Gas Line Closer") and the part to which I object is as follows: "The Navy has already agreed to lease the zone to COG and to rent the firm tractor-sled trains to haul prospecting equipment from Barrow to the Gubik field."

The facts are these: 1.The buffer zone referred to is outside of Naval Petroleum Reserve No. 4 and, therefore, Navy has no control over the leasing of the area. Navy has recommended to Interior that the 2-mile buffer zone above the Gubik gas structure be opened for leasing.

This recommendation was made in the public interest inasmuch as advice has been received that if and when commercial gas production is obtained from the Gubik structure the area would suffer drainage. If Interior acts on this recommendation it is assumed

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BOLTED STEEL TANKS

MASTER-CRAFTED BY COLUMBIAN

They...
GO UP Faster...
FIT UP Better...
STAY UP Longer...
and you get
HURRY UP Service

When you want to set up a tank—look up your nearby Columbian Distributor—because with Columbian Bolted Steel Tanks everything is "UP"—including your saving in time for erection and maintenance cost over the years!

FAST INSTALLATION! Find Your Columbian Distributor Here:

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TEXAS
Miller Tank Co. ABILENE
B. A. Box Tank & Supply Co. BEEVILLE
Federal Tank Co., Inc. BELLAIRE
Martin Tank Co. CORSICANA
Texas Gulf Tank Co. HOUSTON
Columbian Steel Tank Co. (Warehouse) 3705 McKinney Ave. HOUSTON
Martin Tank Co. KILGORE
Gray-Brown Tank Co. LONGVIEW
Mapp Tank Co. ODESSA
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Panhandle Steel Products Co. WICHITA FALLS

CANADA
C W S Tank Co. CALGARY, Alta. EDMONTON, Alta. ESTEVAN, Sask.

Easy to Put Up...Columbian Rigid Frame Steel Buildings

Columbian RIGID FRAME Steel Buildings can be put up in **days**, not weeks or months. They make the best use of available space, from floor to roof . . . give you the strength and permanence of steel at low initial and maintenance cost. They're flexible, movable, fire-safe—ideal for warehouses, pump houses, field offices, tool sheds, etc. Your Columbian Dealer can supply you.

WRITE FOR FREE Columbian Bolted Steel Tank booklet and the Rigid Frame Steel Building folder. They show you why Columbian tanks and buildings are stronger, tighter, longer-lasting.

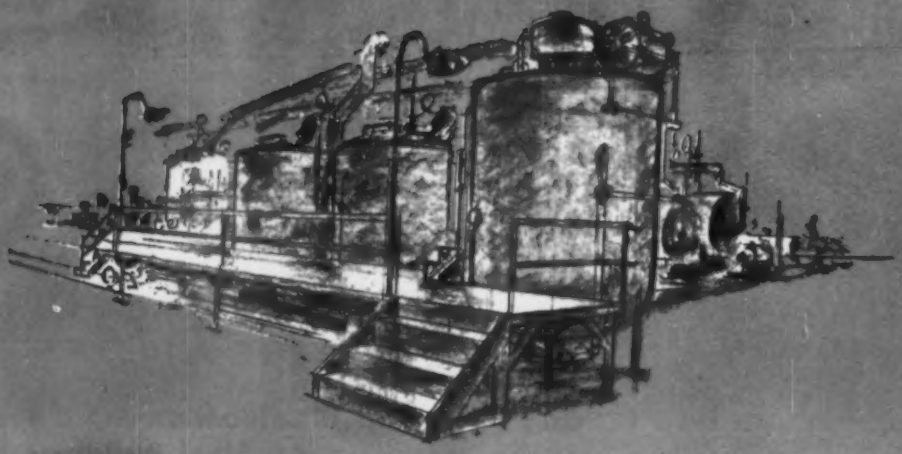
COLUMBIAN STEEL TANK CO.
P.O. Box 4048-J Kansas City, Mo.

STEEL, Master-Crafted by Columbian...First for Lasting Strength

NOW

High pressure processing . . . including Hydrogenation

Truland announces
the installation of
Hydrogenation and Autoclave
reaction facilities
for
high pressure operations.



May we serve you?
Your inquiry will be
treated in confidence.

Send for new booklet
which describes our operation

TRULAND CHEMICAL COMPANY, Inc.
EAST RUTHERFORD, NEW JERSEY

Division of **THE TRUBEK LABORATORIES**

TRULAND

that leasing would be carried out under the mineral leasing laws.

2. Navy is renting a tractor-sled train to COG to move some material to Gubik field. However, this material, which was purchased at public sale, is located at two drilling sites known as Wolf Creek (about 50 miles west of Gubik) and Grandstand (about 30 miles south of Gubik). Surplus property at Barrow has not been sold. It will be placed on public sale as soon as accurate inventories are obtained.

I trust that this information will be helpful in maintaining your excellent record for factual reporting.

A. S. Miller, Capt., USN
Director
Naval Petroleum and
Oil Shale Reserves.

Oil's story needs telling

Dear Sir:

I have just completed the study of Petroleum Panorama. You should be more than congratulated for your factual presentation.

We would be guilty of a grave injustice to the American people if we did not do all in our power to enlighten the public on this vital subject of oil. It is shocking when one interviews business men . . . in fact, men in all walks of life . . . their ideas on depletion, severance taxes, etc., are based on hearsay or misinformation and show the lack of factual knowledge.

There are many things we in the industry could and should do. I have one suggestion: We should immediately write the story of the petroleum industry in interesting serial-story form. It should appear in our newspapers and periodicals for all to read and study.

This subject of petroleum is so important to all in America and the free world. We need unified action so that its progress is not hampered or obstructed. It could mean the difference between freedom and slavery.

H. A. Gehrke
Gehrke Brothers
Augusta, Kans.

Venezuelan consul in Dallas

Dear Sir:

It has come to my attention that there are many people in this area of the country who are unaware of the fact that Venezuela has a consulate in Dallas.

Since I consider it of interest to many of the people who receive your publication, I will appreciate your advising your subscribers that the Con-

PERFORMANCE FOR SALE!

with Hartzite Plastic Adjustable Pitch Cooling Tower and Heat Exchanger Fans

Good performance costs nothing extra ... yet saves so much.

This statement sums up the performance and economy of Hartzell Adjustable Pitch fans made from Hartzite plastic.

Since its introduction in 1941, Hartzite plastic has practically eliminated fan blade replacement problems while providing high efficiency operation.

Hartzite blades have been job-proven on thousands of installations to effectively resist corrosion, abrasion and vibration. Increased strength and efficiency are achieved by use of a tapered blade and a heavily reinforced leading edge.

Welded steel hubs are dynamically balanced and each blade is balanced to a master blade. Gussets provide extra strength and increased safety.

Hartzite fans are available in 10′ to 22′ sizes. Hubs are designed for 2, 3, 4 or 6 blade assemblies.

Again . . . good performance costs nothing extra . . . yet saves so much. Write for all the facts on how Hartzell fans can cut maintenance costs and provide economical, high efficiency operation.

Other famous Hartzell products include controllable and full feathering propellers for light aircraft, crop drying equipment, and farm ventilating fans.

HARTZELL PROPELLER FAN CO.
Engineering Offices in Principal Cities
Div. of Castle Hills Corp.
Piqua, Ohio

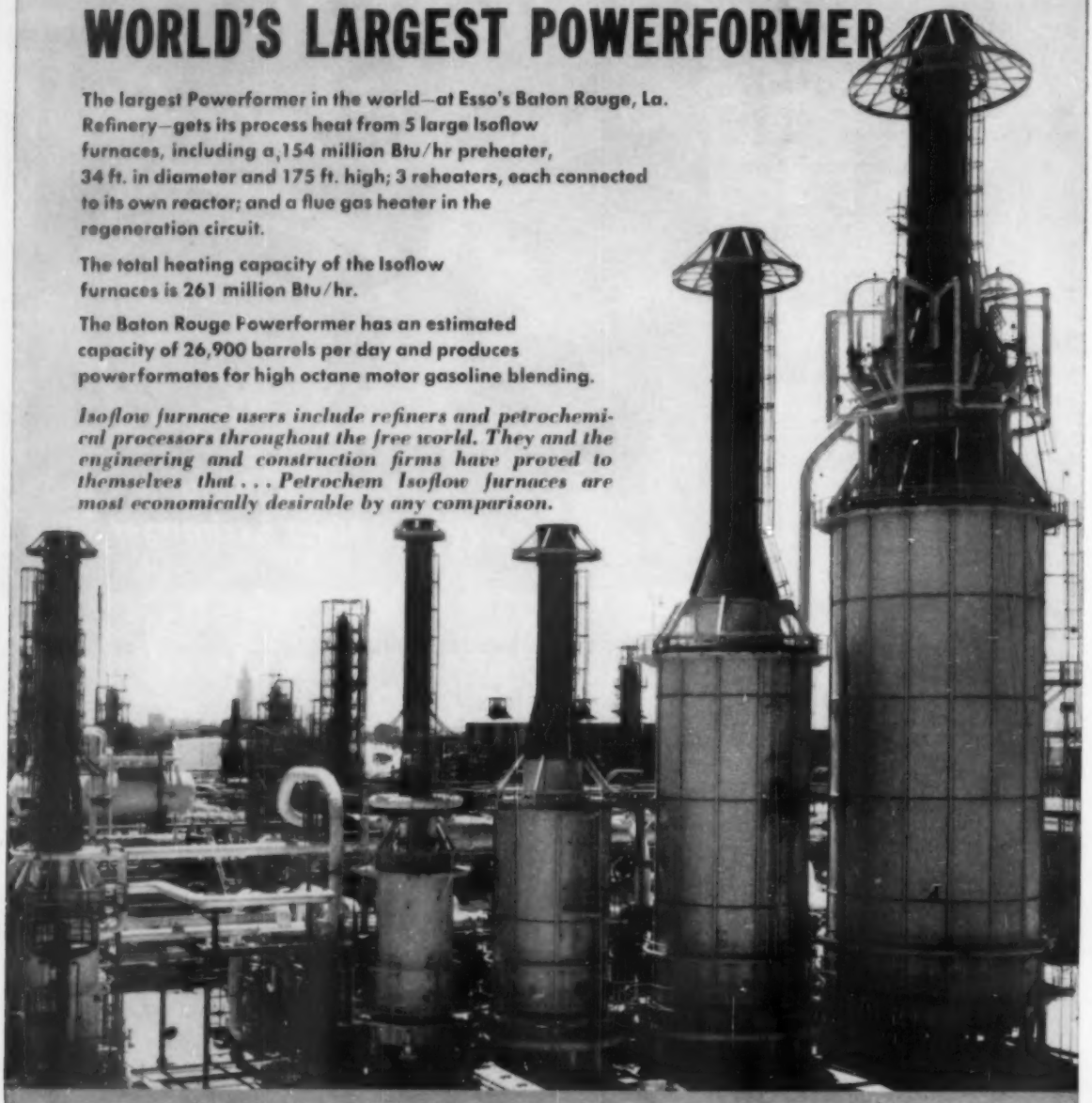
PETROCHEM-ISOFLOW HEATERS
charge
WORLD'S LARGEST POWERFORMER

The largest Powerformer in the world—at Esso's Baton Rouge, La. Refinery—gets its process heat from 5 large Isoflow furnaces, including a 1,154 million Btu/hr preheater, 34 ft. in diameter and 175 ft. high; 3 reheaters, each connected to its own reactor; and a flue gas heater in the regeneration circuit.

The total heating capacity of the Isoflow furnaces is 261 million Btu/hr.

The Baton Rouge Powerformer has an estimated capacity of 26,900 barrels per day and produces powerformates for high octane motor gasoline blending.

Isoflow furnace users include refiners and petrochemical processors throughout the free world. They and the engineering and construction firms have proved to themselves that . . . Petrochem Isoflow furnaces are most economically desirable by any comparison.



PETROCHEM-ISOFLOW FURNACES

UNLIMITED IN SIZE . . . CAPACITY . . . DUTY

PETRO-CHEM DEVELOPMENT CO., INC. • 122 EAST 42nd St., New York 17, N. Y.

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sulate of Venezuela in Dallas functions at 1309 Main St., Room 914-15, week days from 10 to 3, closed on Saturdays and holidays, and that we shall be happy to be of service.

Violeta Jove
Consul of Venezuela
Dallas.

Panorama tells U.S. story

Dear Sir:

My congratulations to you and your staff. I have just received my copy of Petroleum Panorama; it is a monument and fitting tribute to those men whose names have disappeared from the masthead.

I know it will receive world-wide distribution via the oil industry, but I wonder if anyone has realized its potential as an American propaganda device. If you know anyone who can or will finance a few copies, I would like to place them here in Mannheim, where they will be read and studied by young engineers and business men.

Mannheim is a chemical and heavy industry city of 350,000 busy, energetic people. I don't believe the efforts of all our librarians and information agencies have presented the story of our country any more dramatically and effectively than you have done in Petroleum Panorama.

Maj. Lee P. Vincent
Mannheim, Germany.
Provost Marshal, U.S. Army

Canada's private enterprise

"In recent years the government was bitterly attacked for extending help to a gas pipeline project which, in my opinion, fell into the category of a major project of national importance.

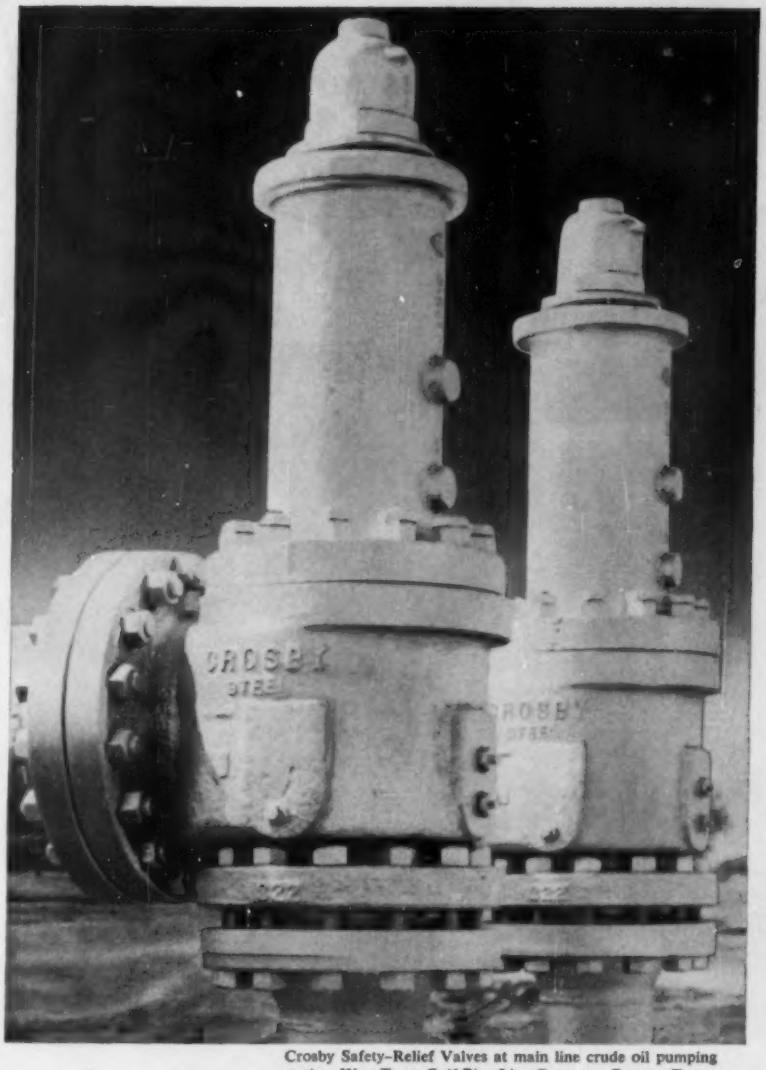
"I have recently read the report of the Royal Commission on Energy with its emphasis on stringent financial regulation of projects of that type and its unfair criticism of the men chiefly responsible for the successful pioneering of the two major gas pipeline projects.

"One of the major responsibilities of government is the provision of the proper climate for private industry. Politicians should see that the tax policy doesn't pay off in terms of votes.

"The government should not enter into any business that competes with private industry. Cooperation between government and industry is a prerequisite to national prosperity."

C. D. Howe, former Canadian trade minister, in a speech to the Junior Investment Dealers Association.

Letters to They Say should be addressed to The Editor, The Oil and Gas Journal, Box 1260, Tulsa, Okla.



Crosby Safety-Relief Valves at main line crude oil pumping station, West Texas Gulf Pipe Line Company, Ranger, Texas.

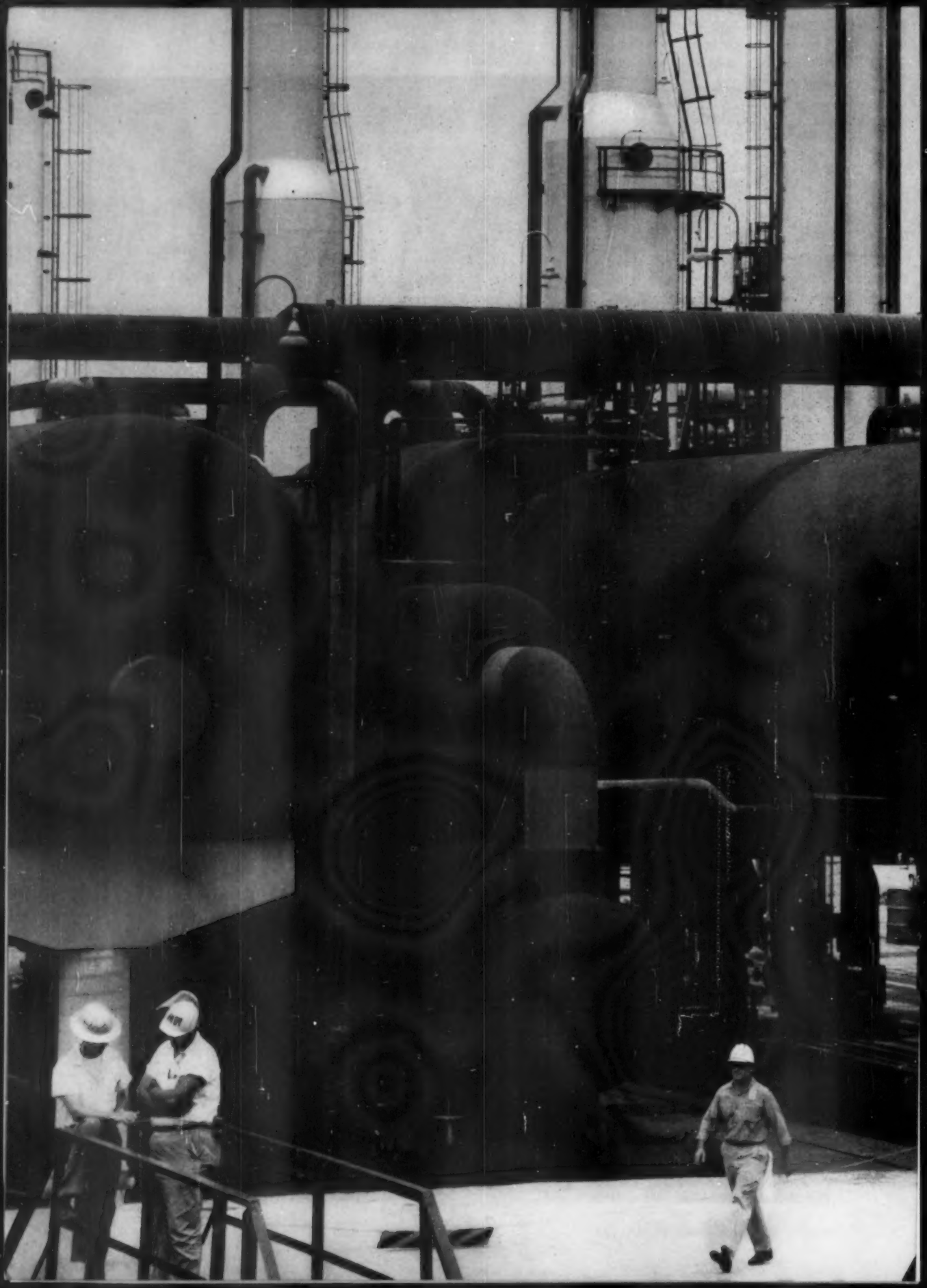
WHERE THERE'S NO COMPROMISE WITH SAFETY . . .

you need the absolute reliability of Crosby Safety-Relief Valves

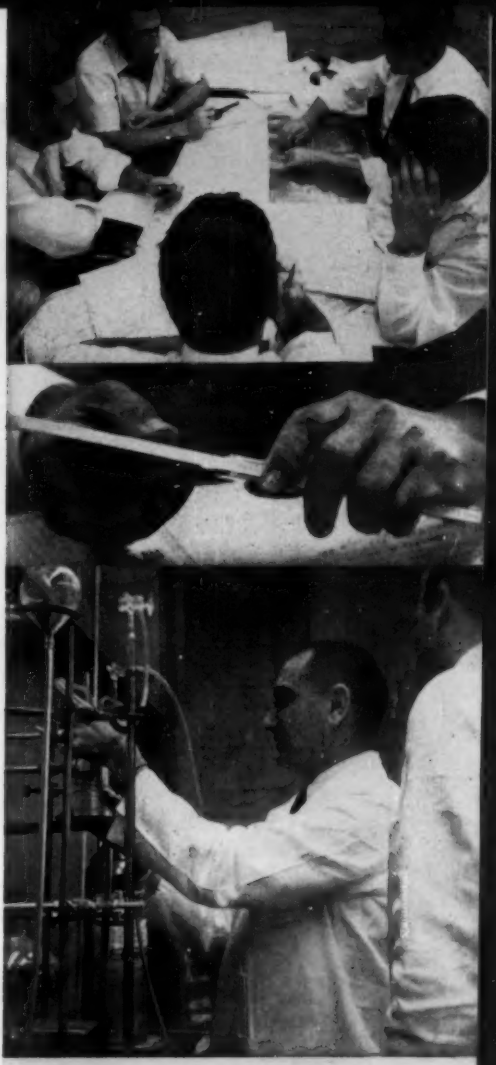
Crosby Valve & Gage Company
The Ashton Valve Company
Factory: Wrentham, Mass.

Boston • New York • Chicago • Los Angeles
Dallas • London • Paris

ALL OVER THE WORLD
CROSBY ASHTON
SAFETY VALVES • RELIEF VALVES • GAGES



These Stratco Effluent Refrigeration reactors are part of the alkylation section of Texas Butadiene & Chemical Corporation's plant in Channelview, Texas. The unit obtains its butylene feed from the dehydrogenation of butane into butadiene and butylene. Depending on marketing requirements, the butylene may be used to make alkylate or recyled back into butadiene production. Alkylation capacity is 6,500 b.p.s.d.



ALKYLATION

There are no easy answers

Automobile engines will continue to demand higher performance from gasolines. Octane numbers will rise and sensitivity ratings will decrease. More gasoline will be produced, and more of it will be of premium grade. The refiners' answer to this challenge will be alkylate—lots of it.

Adding alkylation capacity involves some complex decisions, the weighing of a multitude of factors. Which process to invest in under a given set of conditions; what level of quality to aim for; how large a plant to build—these are difficult questions. To answer them requires a thorough understanding of all the processes, their economics and their practicability under various circumstances.

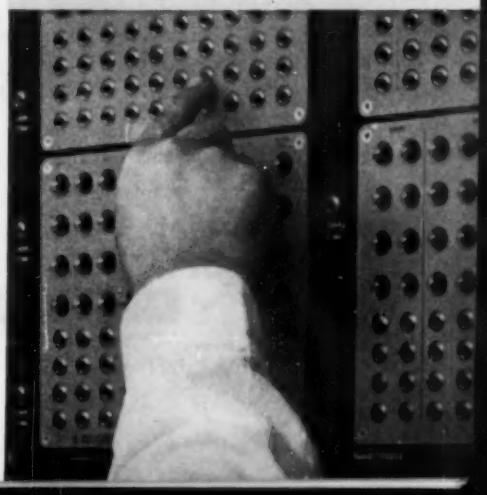
Nearly one-fourth of all the alkylation plants existing today were designed and built by Fluor. This fund of practical experience encompasses all processes under a great variety of circumstances. Fluor's broad knowledge of alkylation should be most helpful to you in planning a plant to fit your set of conditions.

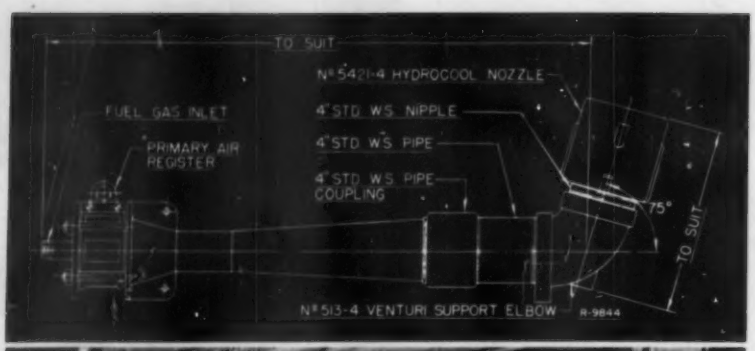
The Fluor brochure, "Alkylation Plants," is a brief guide to the various processes. Write to Dept. 15, The Fluor Corporation, Ltd., 2500 South Atlantic Boulevard, Los Angeles 22, California.

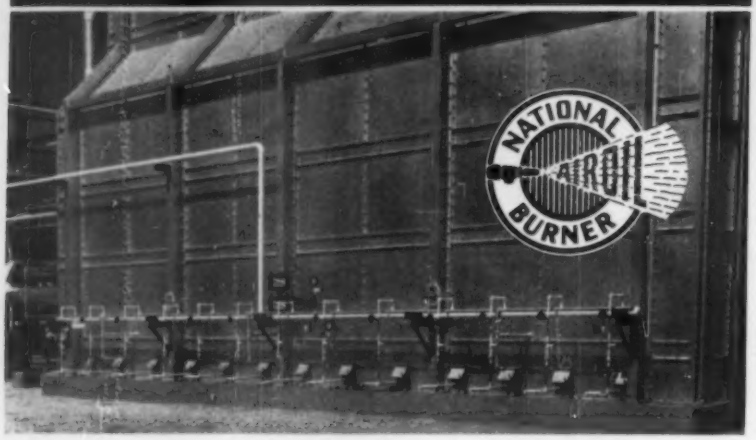
When you consider expansion... the most important investment you can make is in the creative ability of men.

FLUOR

Engineers and Constructors







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As compared with the conventional natural or refinery gas burner nozzle, the HYDROCOOL will produce a short, hot, stable flame with a high turn-down ratio, and with extremely low excess air at the nozzle.

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CALENDAR OF EVENTS

MARCH

31 Seventh annual meeting, Philadelphia-Wilmington section of American Institute of Chemical Engineers, and University of Pennsylvania, Philadelphia.

29-Apr. 2 American Society of Mechanical Engineers, instruments and regulators division conference, Case Institute of Technology, Cleveland.

APRIL

2-3 Society of Petroleum Engineers of AIME, Rocky Mountain petroleum section, Casper, Wyo.

2-3 American Institute of Mining, Metallurgical, and Petroleum Engineers, technical conference on stress corrosion, Mellon Institute, Pittsburgh.

2-4 Society of Economic Paleontologists and Mineralogists, Permian basin section, annual meeting, Roswell, N. M.

2-6 Geological Society of America, Cordilleran section, annual meeting, University of Arizona campus, Tucson.

5-10 Engineers Joint Council, nuclear congress, Cleveland Auditorium, Cleveland.

5-10 American Chemical Society, national meeting, Boston.

6-7 Instrument Society of America, second national symposium on chemical and petroleum instrumentation, St. Louis.

7-8 Sixth Gas Compressor Institute, sponsored by University of Kansas and Southwest Kansas petroleum industry, Randall's Cafeteria, Liberal, Kans.

8-9 Western Petroleum Refiners Association, computer conference, Hotel Tulsa, Tulsa.

8-10 American Petroleum Institute, Division of Production, eastern district meeting, Penn-Sheraton Hotel, Pittsburgh.

14 Independent Oil Men's Association of New England, annual meeting. Hotel Statler, Boston.

14-16 Southwestern Gas Measurement Short Course, University of Oklahoma, Norman.

15-17 National Petroleum Association, semiannual meeting, Hotel Cleveland, Cleveland.

15-17 American Petroleum Institute, Division of Transportation, annual tanker conference, Jung Hotel, New Orleans.

16-17 Rocky Mountain Oil and Gas Association, midyear meeting, Casper, Wyo.

18-22 Petroleum Equipment Suppliers Association, twenty-fourth annual meeting, Boca Raton Hotel and Club, Boca Raton, Fla.

19-23 American Society of Mechanical Engineers, oil and gas power conference and exhibit, Shamrock-Hilton Hotel, Houston.

22-24 American Petroleum Institute, Division of Production, Mid-Continent district meeting, Herring Hotel, Amarillo, Tex.

22-24 Natural Gasoline Association of America, thirty-eighth annual convention, Baker and Adolphus Hotels, Dallas.

23-24 Sixth annual West Texas oil lifting

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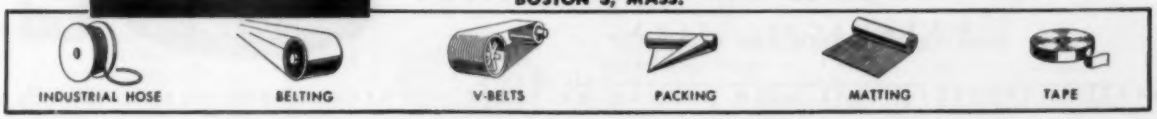

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short course, Texas Technological College, Lubbock, Tex.

24 Society of Petroleum Engineers of AIME, Gulf Coast drilling and production practices meeting, Lafayette, La.

24-25 Society of Economic Paleontologists and Mineralogists, Pacific Coast section, annual spring field trip, Boulder Creek area of Santa Cruz Mountains, California.

26-28 Texas Independent Producers and Royalty Owners Association, membership meeting, Baker Hotel, Dallas.

27-28 Society of Exploration Geophysicists, annual midwestern meeting. Cortez Hotel, El Paso, Tex.

29-30 Western Petroleum Refiners Association, Southwest regional technical-industrial relations meeting, Hotel Paso del Norte, El Paso.

29-30 Pacific Coast Gas Association, operating section, transmission conference, El Mirador Hotel, Palm Springs, Calif.

30-May 1 American Petroleum Institute, Division of Production, Pacific Coast district meeting, Biltmore Hotel, Los Angeles.

MAY

1 Fourth annual petroleum accounting conference, sponsored by Wichita chapters of the Petroleum Accountants' Society of Kansas. National Association of Accountants, the Kansas Society of Certified Public Accountants, and the University of Wichita, Lassen Hotel and University of Wichita campus, Wichita.

3-6 Liquefied Petroleum Gas Association, twenty-eighth annual meeting and trade show, Conrad Hilton Hotel, Chicago.

4-5 American Society of Mechanical Engineers, maintenance and plant engineering division conference, Edgewater Beach Hotel, Chicago.

4-5 Independent Petroleum Association of America, midyear meeting, Westward Ho Hotel, Phoenix.

4-7 American Geophysical Union, annual meeting, Washington.

5-7 Purdue University, fourteenth Purdue industrial-waste conference, Purdue Memorial Union Building, Lafayette, Ind.

6-7 Panhandle Producers and Royalty Owners Association, annual meeting, Amarillo, Tex.

6-8 American Petroleum Institute, Division of Production, Rocky Mountain district meeting, Gladstone, Henning, and Townsend hotels, Casper, Wyo.

7-8 Rocky Mountain Oil and Gas Association, refining committee annual meeting, Petroleum Club Building, Denver.

7-8 Society of Petroleum Engineers of AIME, Permian Basin section oil recovery conference, Midland, Tex.

13-15 American Petroleum Institute, Division of Transportation, annual pipeline conference, Pittsburgh.

14-23 International Petroleum Exposition, Tulsa.

25-27 Chemical Institute of Canada, forty-second annual conference, Halifax, N. S.

27-29 American Petroleum Institute, Division of Marketing, midyear meeting, Savery Hotel, Des Moines.

27-30 American Petroleum Institute, Division of Refining, midyear meeting, Statler Hotel, New York.

30-June 5 Fifth World Petroleum Congress, Coliseum, New York.

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JOURNALLY SPEAKING

Proxmire's Proximity

A FRIEND of the industry, who is a constituent of Senator Proxmire of Wisconsin, relays an interesting report on an informal conversation in which the senator discussed the oil business at length.

Proxmire is the leading Senate opponent of the 27½% depletion provision and one of that body's most outspoken critics of the oil industry in general. He is a brilliant young man, an ambitious politician, and a leader of the so-called "liberal bloc," so he is a man not to be ignored.

Our friend said he was amazed at Proxmire's detailed knowledge of the oil business, but dismayed at the conclusions he drew from that knowledge.

For instance, Proxmire noted that on January 30 Standard Oil Co. (Ind.) raised the price of fuel oil in Wisconsin by 1 cent per gallon and gave as the reason the fact that the weather had been unexpectedly severe, thus creating a big demand and requiring a higher price to induce production of additional supplies.

This struck Proxmire as entirely logical and justified, an evidence that the laws of supply and demand are working as they should in the oil business.

But on February 2, Standard Oil Co. (Ind.) cut the price of crude oil by 7 cents per barrel with the explanation that crude was in oversupply and that the industry's costs did not permit continuance of the old crude price.

This struck Proxmire as entirely illogical, contradictory, and doubletalk. How, he asked, can there be a shortage and an oversupply at the same time?

In the mind of the Wisconsin senator, these two price changes added up to proof that oil prices are not set by supply and demand at all, but are manipulated by the big refiners who take advantage of any opportunity or excuse to gouge consumers or producers—or both at the same time.

During the Suez crisis, in January 1957, Proxmire continued, the big oil companies raised the price of crude oil by 25 cents or more. They defended this on the ground that production costs had been rising for some time and that the price increase was long overdue. This sounded plausible, and the explanation was generally accepted.

But now, Proxmire says, the recent reductions in crude prices show that the 1957 argument was a bunch of hokum. Production costs certainly haven't gone down during the past 2 years. And if crude prices were governed by production costs in 1957, why aren't they in 1959?

Proxmire's conclusion is that they aren't governed by costs but by what the big oil companies think they can get away with.

He thinks this demonstrates that there is too much concentration of economic power in the hands of a few big oil companies, and therefore these big companies should be made smaller. His formula for doing this is to cut the depletion rate for big operators though retaining 27½% for the little fellows, impose a graduated scale of corporation income tax to penalize big companies, and then probably disintegrate the majors by divorcing production, transportation, refining, and marketing.

There's nothing new in this line of thinking among politicians, of course. It's been going on for 50 years, or more.

Our point in mentioning the incident is just this: It is a reminder that oil's enemies are closely watching everything the industry does, and are keeping a tally sheet of alleged crimes and misdemeanors to use against it whenever opportunity arises.

A real student of oil markets knows that the causes of price fluctuations are far more complicated and involved than those cited by Proxmire. But the senator's oversimplification will be quite convincing to a great many people.

So what can be done about it? Say nothing about prices? On the contrary, the industry ought to do a lot more talking about its prices, its costs, and the factors that influence them. It ought to make sure that every major price change is so thoroughly explained that the industry's enemies will have no excuse for drawing the wrong conclusions.

Remember, there's always a Proxmire in close proximity.

—*Henry D. Ralph*

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DOWELL FRACTURING SERVICES using water-base fracturing fluids are increasing profit potentials from many formations. Here are several reasons why many operators prefer water-base fluids.

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Water is adaptable. If tests indicate that emulsions, silicate swelling or excessive fluid loss may occur, Dowell addition agents can be used to combat these problems. Dowell offers a variety of proved addition agents to adapt water-base fluids to most well conditions.

Dowell has recently developed a Fluid Loss Additive (F.L.A.*) that

Water-Base Fracturing Treatments

gives outstanding results in either water or acid. By using this new additive, operators often get greatly improved results with a negligible increase in treatment costs.

Water-base fluids help increase natural permeability. For example, the fresh water used in Riverfrac* dissolves salt that may be present in the producing formation, while the dilute acid used in Duofrac* dissolves limestone.

The examples below on this page show some popular applications of Dowell fracturing services using water. For more information or service, call your nearest Dowell representative. There are more than 165 locations to serve you in the U. S. In Canada, contact Dowell of Canada, Ltd.; in Venezuela, United Oilwell Service. Or write Dowell, Tulsa 1, Oklahoma. *Dowell Trademark

Services for the oil industry

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If you want to fracture a gas well —

RIVERFRAC, using unthickened fresh or salt water, has given excellent results. Because of low fluid costs, large-volume, high-injection-rate treatments are usually profitable. Production increases are often better than those obtained with smaller treatments with more expensive fluids.

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WATERFRAC—using thickened water—is designed to help you. A low sand-falling rate and relatively low fluid loss permit treatment down tubing at low injection rates. Waterfrac is also used to treat water injection wells.

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RIVERFRAC, using fresh water, may give a bonus increase in production by dissolving salt and thus increasing permeability. Many treatments in the Permian Basin have removed more than 50,000 pounds of salt per well. Frequently, this salt removal has resulted in substantial potential increases over what could have been expected otherwise.

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DUOFRAC is specified by many operators. The dilute acid fracturing fluid can be tailored to dissolve substantial quantities of limestone and salt. At the same time, low fluid costs make big treatments economical. The triple action of Duofrac frequently results in unusually large production increases per dollar spent.

If you want to make sure —

Call the Dowell engineer nearest you. He has full knowledge of Dowell's wide variety of fracturing services, using water-base, acid-base, and oil-base fluids. His records of local conditions, as well as the experience of the entire Dowell organization, will be of great help in selecting the proper treatment.

New "FRACTURING GUIDE." Now in use exclusively by Dowell engineers, this revolutionary new system has increased the success ratio of fracturing treatments by more than 50%. Ask your Dowell representative to *engineer* your next treatment using the "Guide" manual. This extra service costs you nothing.

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Things look better for the refining industry

A GOOD OMEN for improved stability in the oil industry is the slowdown in expansion of refinery capacity. This will gradually ease the pressure to run more crude than the market requires.

This year will see very little new capacity added, and no big new projects are in sight for completion during the following year. So if demand increases as anticipated, there will be a gradual decline in the excess capacity which has been such a depressing factor on prices and earnings.

The crude-throughput capacity of U. S. refineries is expected to hold a little under 10,000,000 bbl. per day for the next couple of years at least. This should be ample for all normal requirements and still leave a cushion for emergencies.

REFINERIES OPERATED at only 81% of capacity last year, compared with 87% in 1957. On the basis of forecast refinery runs, 1959 should see refineries used to about 85% of capacity. A practical cushion would be a national capacity about 10% above annual average runs.

Last year demand dropped 0.5%. Refinery runs dropped 2.8% due to imports of products and reduction of inventories. But refinery throughput capacity increased 5.3%—the culmination of projects launched months or years earlier.

This year demand is expected to increase by 4.3%, refinery runs by 7.8%, and refinery capacity by only 1.7%. Thus the disparity in trends is being corrected, and if the presently indicated movement of these ratios continues for another year or two the refining industry should be in a much healthier condition.

Refinery construction has not stopped entirely, nor will it. There will still be new downstream processing units and equipment rearrangements to upgrade product quality and improve operating efficiency without increasing crude-throughput capacity. However, most refineries, both major and independent, are now pretty well modernized and in position to compete for today's product specifications.

A GOOD YEAR is in prospect for the refining industry as a whole, and particularly for the independent refiners. Not only is excess capacity declining due to the halt in new construction, but other factors are more favorable than last year.

Demand is improving. Stocks are in somewhat better shape than a year ago. A limit has been put on products imports. Every refiner can get a share in the competitive advantage of imported crude. The octane race is less acute, and most plants can now meet quality requirements.

The only way the picture can be spoiled is for refiners to forget that they should hold that 15% excess capacity as reserve and not try to use it by making more products than can be consumed at any price.

Drilling Industry Split on Wage Issue

- California and most Gulf Coast contractors start giving their crews the 5% increase granted earlier by companies with production and refinery workers.
- Trend, however, is not spreading throughout the oil patch. Contractors in some areas say they need a higher footage rate to cover added labor costs.

WAGE RATES in the drilling industry are becoming a jungle.

The pay for crew members differs sharply from region to region. And the difference is nearly as sharp company by company.

This difference will be even greater if the present pattern of pay increases now going into effect prevails. The situation:

. . . California and most Gulf Coast contractors generally are granting wage raises averaging about 5%.

. . . Contractors in rest of the country have not yet followed suit. All are studying the issue, however, and this may change later, especially if drilling picks up strength this summer.

. . . Every contractor says he favors higher wages for his men, but many complain that present footage rates keep them operating on such a small margin they can't afford to increase the payroll.

Typical Pay Scales for Drilling Crews

(Prior to 5% Increase)

Area, firms surveyed	Tool pusher (monthly)	Driller (hourly)	Derrickman (hourly)	Motorman (hourly)	Floorman (hourly)
California		$3.80	$3.00	$2.75-85	$2.70-80
Rockies (36)	$768	2.76	2.17	2.16	2.07
Oklahoma (34)	693	2.47	1.87	1.90	1.81
Kansas (22)	729	2.39	1.84	1.79	1.78
Tri-State, Michigan	664	2.39	1.82	1.81	1.80
West Texas-New Mexico (51)	749	2.65	2.01	2.04	1.92
East Texas, Louisiana, Arkansas, Mississippi (29)	712	2.61	1.98	1.98	1.89
Gulf Coast (43)	762	2.58	1.95	1.86	1.85
Offshore (14)	816	2.75	2.08	2.06	1.98

California different . . . Drilling workers in California now getting pay raises are the best paid in the country and have the best hours.

The 5% wage increase is expected to become universal on the West Coast by May 1. Contractors on the coast have a history of following general oil industry wage boosts. They raised wages last time the producing and refining companies did.

First drilling crews to get the raise in California were those employed by integrated companies or by companies with production. They raised the pay of drilling crews at the same time production or refinery workers got an increase.

One large contractor explained that he also was meeting the higher pay scales in California because the operators would allow him to add the extra wage cost to current wells and include it in bids on later ones. He declared this wasn't true in the rest of the country and that's why he was limiting his pay increase only to his California crews.

New average wages in California range from $3.99 an hour for drillers to $2.84 an hour for floormen. Pay had been $3.80 for drillers, $3 for derrickmen, $2.75 for motormen, and $2.70 for floormen.

California drilling crews work a 42-hour week compared with a 56-hour week for the rest of the country. This usually means California crew members have three 10-hour tours and a 12-hour tour each week and contractors hire four crews to cover all the tricks. This makes his per day crew costs run to $440 compared with Mid-Continent costs of $330 daily.

The Gulf Coast . . . A majority of contractors operating on the Gulf Coast and in South Texas apparently are granting pay increases, but the move is far from unanimous.

The smaller and medium-sized companies have moved first.

Jim Teague, former president of AAODC and now president of Columbia Drilling Co., Houston, said his four-rig firm was increasing wages slightly more than 5%.

He observed, "I don't think it is justified nation-wide — prices don't justify it. But our people deserve the same treatment as others if we expect to hold them."

A Lake Charles, La., contractor said he raised wages early in March at an extra cost of $25 daily per rig. He said his men deserved the raise, but he couldn't afford to give it. "We were forced into it," he said, "because we would start losing personnel if we didn't."

A Corpus Christi firm is standing pat on wages now because it raised the scale 18 months ago. Since then it has paid drillers $2.70 an hour, motormen and derrickmen $2.06, and floormen $1.94.

These scales are about equal to the new rates being adopted by contractors in the San Antonio area, where increases of 6.25% are going into effect.

The larger contractors haven't joined the parade but in most instances they already were paying higher than average wages. Some of them raised wages late last year and don't feel another increase now is justified.

One well-known Houston contractor observed that unless the drilling

industry got its wages in line many contractors will be in bad shape because they won't be able to keep their men.

Elsewhere . . . Contacts in Fort Worth, Dallas, Midland, Tulsa, and Denver indicated contractors in these areas won't raise wages.

Most of the large West Texas contractors are standing pat on their wage scales. These companies pay better than average wages with drillers getting $2.72 an hour, derrickmen and motormen $2.06, and floormen $1.96. This same scale is standard for the larger operators in the Mid-Continent.

Don Johnson, executive vice president of Carl B. King Drilling Co. of Midland, said nearly all contractors in West Texas are bidding at cost right now. The extra cost of a wage increase wouldn't be large, but still if a company is just breaking even there's nothing left over.

Johnson feels his company couldn't raise footage rates to take care of the hike. He estimated a 5-cent increase in footage rates would be needed to pay for a 5% wage hike. Johnson said the drilling-price structure in West Texas is still deteriorating.

"We still experience price softening every time a well is started in this area," he said. West Texas has about 600 rigs available and for some time now has been able to keep only 350 to 375 busy. The outlook is that this rig imbalance will continue.

Exception to the West Texas pattern is Rowan Drilling Co., Fort Worth, which has raised its wages for drilling crews. Rowan is now paying drillers $2.86 an hour, up 14 cents; derrickmen and motormen $2.16, up 10 cents; and floormen $2.06, up 10 cents.

Rowan is a big contractor with 31 rigs, 25 of them currently busy. The wage increase is costing Rowan about $20 a day per rig. A Rowan spokesman said the company is being compensated for the hike on about half of its rigs and hope eventually to increase footage rates sufficiently to cover all the increase.

In Tulsa and Denver, contractors said they had studied the wage problem carefully but couldn't justify a pay increase from any economic standpoint.

Some contractors were very bitter at policies of the operating oil companies. Said one Tulsan: "They raise the pay of their own workers but pressure the contractors to keep rates so low we can't raise our men."

Another contractor observed this confused state of affairs would exist until the drilling industry settled on uniform wage scales.

Labor Front Is Busy

. . . as Great Northern settles its 60-day strike, OCAW wins its first election in an Indiana Standard refinery.

LAST WEEK was a busy one on the refining-labor front.

There were these developments:

. . . **Great Northern** Oil Co.'s 60-day strike at its Pine Bend, Minn., refinery was settled.

. . . **D-X Sunray** Oil Co.'s workers at its 74,000-bbl. Tulsa refinery voted 655 to 381 against affiliating with the Oil, Chemical and Atomic Workers Union.

. . . **Standard Oil** Co. (Ind.) workers at the Sugar Creek, Mo., refinery voted to let OCAW represent them. It was the first victory for OCAW in an Indiana Standard refinery.

. . . **Esso Standard** Oil Co.'s Baton Rouge workers became the object of a three-way skirmish over representation.

The 34,000-bbl. Great Northern refinery, operated by supervisory personnel during 9 weeks of strife, was in full operation again. Some 245 employes returned.

"The new agreement, to run until November 1, 1961, provides a wage increase and improved life, health, and accident insurance and other benefits," W. J. Carthaus, president, announced.

Esso battleground . . . A three-way fight appeared possible at the 355,000-bbl. Esso Baton Rouge plant over which union would represent its thousands of workers.

A 54-member plant council of the Independent Industrial Workers Association recommended, by a split vote, that Esso workers consider joining the Teamsters. This followed a mass meeting addressed by Teamsters head James Hoffa.

This action brought two reverberations. A "Committee for Independence" was formed by workers to oppose joining the Teamsters or any nationwide union. A Negro branch of the independent union attacked negotiating procedures, saying it had not been consulted.

There was one big question. Observers wondered if the independent group really was serious about joining the Teamsters, or if this was being used as a threat to pressure Esso into more liberal clauses in its own contract, which expired last July.

In past years, the Baton Rouge independent union has maneuvered Esso into granting contract demands by publicly courting the AFL-CIO Building Trades Union, the United Mine Workers and others. Once bargaining goals were achieved, IIWA promptly dropped the courtship.

A personal appeal to Esso workers to join his forces was to be made last week by O. A. Knight, OCAW president.

Management was concerned and did not remain on the sidelines.

Voorhies outspoken . . . A frank statement that the "company is concerned that our employes may be caught in an outside struggle for union power" was made by H. J. Voorhies, Esso vice president.

"Our people have known 40 years of industrial peace," he said. "Under leadership of their representatives, who are close to local problems, they have secured wages, benefits, and working conditions outstanding in the industry."

Esso is seeking to establish a "refinery mechanic" classification. Voorhies last week made concessions on the issue by stating that "the company is willing to restore craft identification provided a practical way is found to give the flexibility needed in mechanical work assignments."

OCAW wins, loses . . . After workers at Indiana Standard's Sugar Creek refinery voted 416 to 317 for OCAW representation, the union followed with a petition for an NLRB election on the same issue at Standard's Casper, Wyo. refinery, where 500 are employed.

Both Sugar Creek and Casper workers have been represented by the Central States Petroleum Union.

Employes at D-X Sunray's Tulsa refinery overwhelmingly voted against OCAW affiliation. About 5% of the work force under carpenter, electrician, and welder classifications is unionized.

Contract discussions still are in progress at Humble Oil & Refining Co.'s Baytown, Tex. plant. R. R. Dawson, president of the Baytown Employes Federation, said however, that he has had no official discussions on joining the Teamsters.

The 19,000-bbl. Phillips Petroleum Co. refinery in Okmulgee, Okla., struck in January, still is down. Negotiations are expected to resume this week with return of a federal conciliation commissioner.

Here's How 20 Companies See Stocks, Demand

(Millions of barrels)

	Crude Oil U. S.		Crude Oil U. S. less West Coast		Crude Oil Texas Origin		Gasoline	
	April 1	Nov. 1	April 1	Nov. 1	April 1	Nov. 1	April 1	Nov. 1
Atlantic	245-250	250-260	210-220	215-225	85	87	200-210	160
Cities Service	250	260	220	230	114	119	190	160
Continental	255	257	222	224	94	95	185	155
Eastern States	260	265	220	230	115	120	190	135
Gulf	240	240	210	210	105	105	160	120
Humble	260	265	225	230	116	119	200	162
Magnolia	250-255	255-260	217-222	222-226	110-112	112-114	190-195	150-155
Phillips	250-255	250-225	215-220	215-220	110-115	110-115	180-190	150-160
Pure	255	260	228	231	110	115	190-202	160-168
Shell	250	255	220	225	110	112	190	155
Sinclair	250	255	215	220	112	115	188-192	154-158
Socony Mobil	250-255	254-259	215-220	219-224	108-116	110-118	190-198	155-165
Standard (Calif.)	265	270	230	235	100	100	190	155
Standard (Ind.)	255	255	220	220	115	115	200	165
Standard (N. J.)	255	260	220	225	112	115	195	160
Standard (Ohio)	260	270	225	235	95	100	180	150
Sun	250	255	215	220	115	118	185	155
Suntide	255	255	220	220	115	115	190	165
Texaco	265-270	265-270	231-235	231-235	122-125	122-125	185-190	155-160
Tidewater	250-260	255-265	220-230	225-235	90-95	95-100	185-195	150-160
Composite	254.4	258.5	220.9	255	108.2	110.5	189.7	154.8

Top Executives Expect '59 Demand to

• Top oil men paint a rosy picture—but there are "ifs." One is restraint by state agencies in the face of new imports program. Texas heeds advice and cuts allowable.

THE DOMESTIC oil industry weathered its severe recession in 1958. And if it is careful not to overproduce or refine too much crude during the next few months, 1959 may go into the books as a really good year.

This is the outlook as painted for the Texas Railroad Commission by top executives of the nation's major oil companies.

Executives of about 24 companies were present at the March meeting to give the commission benefit of their companies' thinking on anticipated demand and desired levels of crude and product stocks for 1959.

The testimony was given in conjunction with the regular hearing to set the Texas crude-oil allowable for April. It will be used by the commission in regulating Texas oil output the rest of the year.

The rosy tone of this year's reports contrasts sharply with the universally prevalent gloom of a year ago.

Augustus C. Long, board chairman of The Texas Co., for instance, termed crude and product inventories as now being "in great shape." He predicted the industry can look forward to entering a "more prosperous period."

W. K. Whiteford, president of Gulf Oil Corp., said the new mandatory limits on imports present the domestic industry with "an ideal opportunity" to mop up the last of last year's disastrous petroleum surpluses. With restraints on the part of state regulatory bodies and industry self discipline, the industry "ought to be in better shape this year than in a long time."

Humble Oil & Refining Co., the country's biggest crude-oil producer, also is optimistic. Morgan Davis, president, told the commission stocks generally are "very close to desired levels." Gasoline, he said, is slightly on the high side. But, here too, there has been "a striking improvement in inventories over last year."

Demand to rebound . . . The general optimism over the domestic industry outlook this year was predicated not only on satisfactory inventories and an import cutback but also on an anticipated sharp hike in domestic demand for petroleum.

The individual predictions ranged from the low of a 3 to 4% gain predicted by Eastern States Petroleum Co., Houston, to a high of 5% estimated by Shell, Pure, Phillips, Humble, and Suntide Refining.

The 4.43% boost in demand predicted for 1959 compares with a meager 1.14% composite gain predicted last March for 1958 by the same 20 companies.

Stocks about right . . . The 20 oil firms' composite estimate of the desired level of national crude stocks as of April 1 was 254,400,000 bbl. It came close to hitting on the nose the actual crude-stocks level of roughly 256,000,000 bbl. as of March 1.

The 1959 ideal levels of crude stocks are substantially lower than the desired levels last year.

The composite this year was 254,400,000 bbl. as of April 1 and 258,500,000 bbl. as of November 1. This

for the Remainder of 1959

Kerosine		Distillate		Residual		Demand increase 1959 over 1958 %
April 1	Nov. 1	April 1	Nov. 1	April 1	Nov. 1	
18	30	65-70	150-160	35-40	45-50	3.5-4.5
18	35	65	155	38	49	4
16	32	65	160	35	45	4.5
22	45	75	130	40	60	3-4
15	30	45	145	35	45	4-5
17	35	71	173	39	52	5
16-19	35-38	64-68	165-170	35-37	48-50	4
16-17	35-36	65-70	155-165	36-38	45-50	5
17	31	71	157	37	48	5
18	38	67	162	38	48	5
18	36	64-68	156-160	36-38	48-50	4-4.5
17-20	38-41	63-67	165-175	37-39	48-50	4-5
20	35	65	155	40	45	4.8
15	30	65	165	40	50	4-5
15	29	70	150	40	50	4.5
18	35	65	165	37	50	4
17	32	65	150	40	50	4
20	35	80	160	40	50	5
18-19	36-37	65-66	150-155	38-40	50-55	4
16-18	32-36	65-70	155-165	35-40	45-50	4-5
17.6	34.5	66.7	157.6	38	49.2	4.43

Jump 4.43%

compares with last year's composite of 260,330,000 bbl. for April 1 and 264,430,000 bbl. for November 1.

Executives attributed the decrease mainly to the fact that the oil companies learned how to live with smaller inventories last year.

Excluding the West Coast, ideal crude-stocks levels for April 1 and November 1, respectively, were placed by the companies compositely as 220,900,000 and 225,000,000 bbl. Composite desired level of crude stocks of Texas origin was 108,200,000 bbl. for April 1 and 110,500,000 bbl. for November 1.

This is the first year the commission solicited company thinking on ideal stocks levels nationally excluding the West Coast and for oil of Texas origin.

Contrary to crude, the composite desired gasoline-stocks levels increased slightly over last year. This year's composite of 189,700,000 bbl. for April and 154,800,000 bbl. for November compares with last year's ideal levels of 187,330,000 bbl. for April and 153,100,000 bbl. for November.

Desired levels of other products are almost identical with last year's.

Crude questioned . . . Executives of some companies were questioned closely by the commission as to why they were recommending lower crude stocks than last year while at the same time predicting a large demand gain.

William J. Murray, Jr., member of the commission, said the agency was anxious not to set allowables too high but likewise didn't want to go too low.

Whiteford of Gulf replied that last year showed his company it could operate safely on lower inventories—also that adequate production and transportation capacity exists to handle higher production if needed.

Shell's executive vice president, M. E. Spaght, said his company's lowered crude stocks estimates also stemmed from experience last year which showed Shell it could live with lower stocks.

Commission praised . . . Credit for a very great deal of the improvement in oil's condition since last year was laid at the door of the commission by many of the industry's top brass.

The commission's militant slashing of the Texas oil allowable throughout the spring and early summer was the big factor, they said, in extricating the industry from a situation in which it found itself "drowning in oil."

Conoco to Expand

by acquiring control of San Jacinto in stock swap.

CONTINENTAL Oil Co. is buying a two-thirds interest in San Jacinto Petroleum Corp., a growing independent with considerable holdings and production in the U.S. and, more recently, in Venezuela.

Subject to approval of San Jacinto stockholders, Continental will take control of the company through a stock exchange. Based on the value of Continental stock, the deal will involve about $55 million.

San Jacinto's domestic oil and gas properties are located in Texas, New Mexico, Colorado, Utah, Louisiana, and offshore Louisiana.

San Jacinto is the operator of a 27,000-acre Lake Maracaibo lease in Venezuela now producing 40,000 bbl. daily from 14 completed wells. With 30% ownership, San Jacinto's share of production is about 12,000 bbl. daily. Also, San Jacinto has a 25% interest in Maracaibo's Block 10 with four completed wells. Phillips Petroleum Co. is the operator.

San Jacinto also has about 3,500 bbl. daily production in Iran.

Under the stock deal with Continental, San Jacinto will authorize and issue to Continental twice the number of shares of common stock which San Jacinto has outstanding or reserved for stock options and conversion of its convertible debentures.

In return, Continental will deliver to San Jacinto 824,000 shares of Continental capital stock, of which 739,788 shares will be distributed as a dividend by San Jacinto to its present stockholders, at a rate of 0.344 shares of Continental stock for each share of San Jacinto stock now held.

The balance will be reserved for the exercise of San Jacinto's outstanding stock options and for conversion rights under its outstanding convertible debentures.

Anaconda Makes Oil Debut

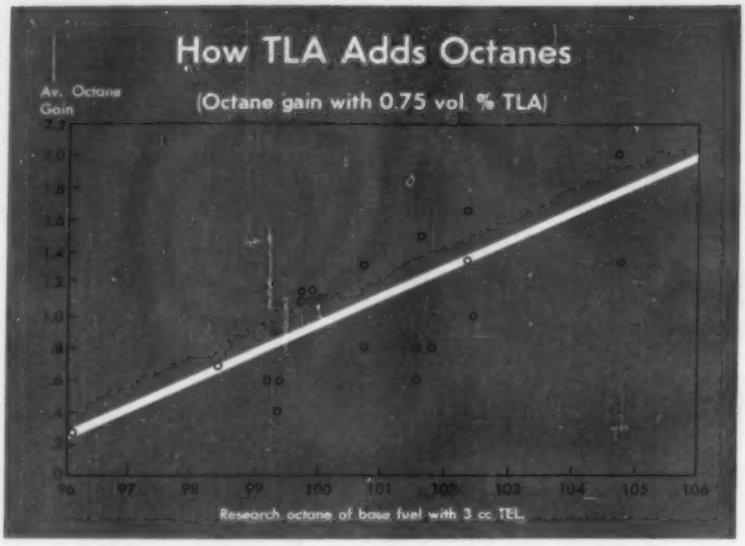
ANACONDA Co., giant in mining and metals operations, will make its entry in the oil and gas industry by drilling five wildcats in Montana.

The company recently paid $35,000 for leases on 23,000 acres of state school land in western Cascade County and eastern Lewis and Clark County. The wells will include three Madison and two Devonian tests at 3,350 to 6,250 ft.

Anaconda has reportedly made a farmout deal with Shell Oil Co., which has done extensive surface geology and seismic work in the area.

TLA—New Route to Higher Octanes

• Texaco says new additive can kick up leaded-premium ratings from half to more than two full numbers.



A NEW WAY of raising octane ratings of premium and superpremium gasoline was announced last week by The Texas Co.

An antiknock bonus can be obtained, Texaco said, by adding tertiary butyl acetate to an already-leaded base gasoline.

This additive has the effect of adding from one-half to more than two full octane numbers to fully leaded gasoline ranging from 98 to 106 Research number (see chart).

The degree of improvement effected by the additive varies directly with the octane value and TEL content of the base fuel. The higher the octane value of the base stock and the greater its lead content, the greater the degree of octane appreciation.

Since the additive is effective only in leaded gasoline, it has been given the trade name of Texaco Lead Appreciator (TLA).

Tests show that TLA is almost equally effective on both research and motor octanes. As a result, road octanes are comparably improved. Use of the product has little effect on sensitivity.

The additive . . . The product, a petrochemical, is water-white, nontoxic and sweet smelling.

It has a boiling point of 205° F., which puts it in the middle of the boiling range of gasoline. Its freeze point is 75° F. It is a product of the reaction of isobutylene with acetic acid.

TLA is completely miscible with gasoline hydrocarbons so that it involves no blending problems. Its action is actually independent of the hydrocarbon composition of the motor fuel, and it has no effect on other additives that may be used.

A peculiar characteristic of TLA is that its value improves as octanes increase. This is in contrast to TEL alone, which decreases in effect as octanes go up. This characteristic will enable TLA to offset the higher costs of building higher octanes into gasoline.

Available when needed . . . Development of TLA was announced March 25 in New York by F. H. Holmes, vice president in charge of Texaco's research and technical department.

Holmes said that it was the result of years of research during which more than 700 chemicals were tested.

TLA, he said, has been produced only in semicommercial quantities and commercial production will be delayed until trade inquiries warrant it.

Holmes said that Texaco, itself, will not use the product immediately since its existing facilities are capable of producing sufficiently high quality gasoline. The company will almost certainly use it, he said, as competitive quality increases.

Both he and Dr. Wayne Kuhn, general manager of Texaco's research and technical department, see it as a tool particularly suitable for companies having difficulty in maintaining their position as octane values climb.

How it's used . . . Since TLA has virtually no beneficial effect on regular grade gasoline, now averaging 91.5 octane throughout the country, its use will be limited to premium and superpremium grades.

Average premium is now 99. With the addition of TLA, this could be boosted to possibly 99.8 or 99.9 octane. Similarly, the highest octane superpremiums, now ranging up to 102.4 octane, could possibly add 1.3 numbers with the addition of TLA.

Ideally TLA will be used in the proportion of 0.75% by volume in gasoline with 3 cc. of TEL. The quality of the product could be improved further if it were possible to increase the TEL content.

Since the company has had no experience with commercial manufacture, it declined to present cost figures.

Development of the product was disclosed during the previous week to Ethyl Corp. and Du Pont, the two manufacturers of TEL, and to the four major automobile manufacturers, General Motors, Ford, Chrysler, and American Motors. Holmes described their reaction as "interested."

He said Texaco has critically road-tested the additive in nearly 1,000,000 miles under all types of weather conditions. In addition, about 1,650,000 gal. of the gasoline has been market-tested in the Northeast and several points in the South without any customer complaints.

Northern Natural to Expand

A FEDERAL Power Commission examiner has approved expansion of Northern Natural Gas Co.'s pipeline system to increase capacity by nearly 100,000 M.c.f. per day.

The decision, if allowed to stand by the full commission, will permit Northern Natural to serve a new area in northern Illinois and to increase deliveries to 23 existing customers.

Cost of the expansion is estimated at $15,956,500. The new customer, Northern Illinois Gas Co., Aurora, Ill., also would spend an estimated $12,420,000.

Northern Illinois is to take 50,000 M.c.f. per day at a point near East Dubuque, Ill.

Plans call for Northern Natural to lay 46.3 miles of 30-in. loops in Iowa,

Nebraska, and Kansas. The company also would install 6,000 hp. in compressor stations and build an 18-mile extension to an existing lateral line to serve the new customer.

The second project would permit increased deliveries of 49,891 M.c.f. per day to existing customers. It calls for 57.4 miles of mainline loops in Iowa, Nebraska, and Kansas, and addition of 8,000 hp. in compressor stations.

New facilities planned by Northern Illinois include 138 miles of 22-in. mainline. Northern Natural's certificate is subject to approval of the Northern Illinois project by the Illinois Commerce Commission.

Canadian Oil Cut

in price; pipeline tariff reduced to eastern market.

A MOVE is under way to make western Canadian crude from 22 to 25 cents a barrel cheaper in eastern refining markets at Sarnia and Toronto.

Imperial Oil, Ltd., early last week cut its posted prices from 14 to 17 cents a barrel on western crude. The 14-cent cut was on Alberta crude and the 17-cent cut on Saskatchewan oil.

New prices now include Redwater $2.42, Leduc Woodbend $2.53, Golden Spike $2.47, Pembina $2.38, Steelman $2.44, and Virden $2.31. Imperial buys about 200,000 bbl. daily, nearly one-third of the production. Other buyers are expected to follow its pricing lead.

Interprovincial Pipe Line Co. at the same time cut tariffs for eastern movement by 8 to 12 cents a barrel.

The Edmonton-Sarnia rate was cut 8 cents a barrel, the Cromer-Sarnia rate 5 cents. The tariff for Sarnia-Toronto movement was cut 4 cents a barrel.

New rates are Edmonton - Sarnia, 56 cents; Edmonton-Toronto, 60 cents; Cromer-Sarnia, 43; Cromer-Toronto, 47. Tariffs from other receiving points to these areas and tariffs to delivery points in Michigan were reduced proportionately. Other rates remain unchanged.

The explanation . . . Both moves were aimed at making Canadian crude competitive with world crude in the Sarnia and Toronto markets.

Imperial explained its price cuts were in line with recent crude price changes in world markets. Interprovincial said its reductions were made to offset opening of the St. Lawrence Seaway and recent cuts in postings of foreign crude.

watching WASHINGTON

Joe Reilly

• FPC changes pace in Chicago gas case

AN EARLY RULING WILL BE HANDED DOWN by the Federal Power Commission on the long-delayed extension of gas service in the Chicago area.

Oral argument has been set for April 10 on the companion applications of Midwestern Gas Transmission Co. and its parent firm, Tennessee Gas Transmission Co. The companies are seeking construction certificates by May 1 so the new gas service may begin next winter.

Because of the urgency of the case, the commission has decided to omit the examiner's decision and rule on the applications directly. The shortcut will permit the FPC to settle the issue by the May deadline.

If the FPC approves the projects by that date, the ruling will be one of the fastest ever handed down on a major new pipeline. The applications were filed last November 4, barely 6 months before the companies hope to start work.

THIS SPEED REPRESENTS A SUDDEN CHANGE of pace by the commission. The earlier Midwestern-Tennessee proposal to serve Midwest towns was stalled for nearly 3 years. Their projects were turned down last October, along with competing proposals by other pipeline companies.

But the companies involved are not the only ones who have been waiting a long time for expansion of gas service. During the long waiting period, demand for gas has continued to grow. There are now an estimated 250,000 customers waiting for gas in the Chicago area alone.

George R. Perrine, chairman of the Illinois Commerce Commission, has urged early action by the FPC. Because of the great demand for gas in space heating, he went on record in favor of a rate which would permit off-peak sales of gas for boiler fuel if necessary to justify the new supply.

Midwestern's earlier plan called for a two-way pipeline handling both Canadian and U. S. gas. The plan now before the FPC calls for use of domestic gas only.

Midwestern's proposed project would cost about $50,815,000. It would include about 350 miles of 30-in. pipe between Portland, Tenn., and Joliet, Ill.

The parent company would spend an estimated $61,548,000 expanding its system to supply the gas to Midwestern. The TGT project would include about 157 miles of 36-in. pipeline loops to increase the system's capacity by more than 360 million cubic feet per day.

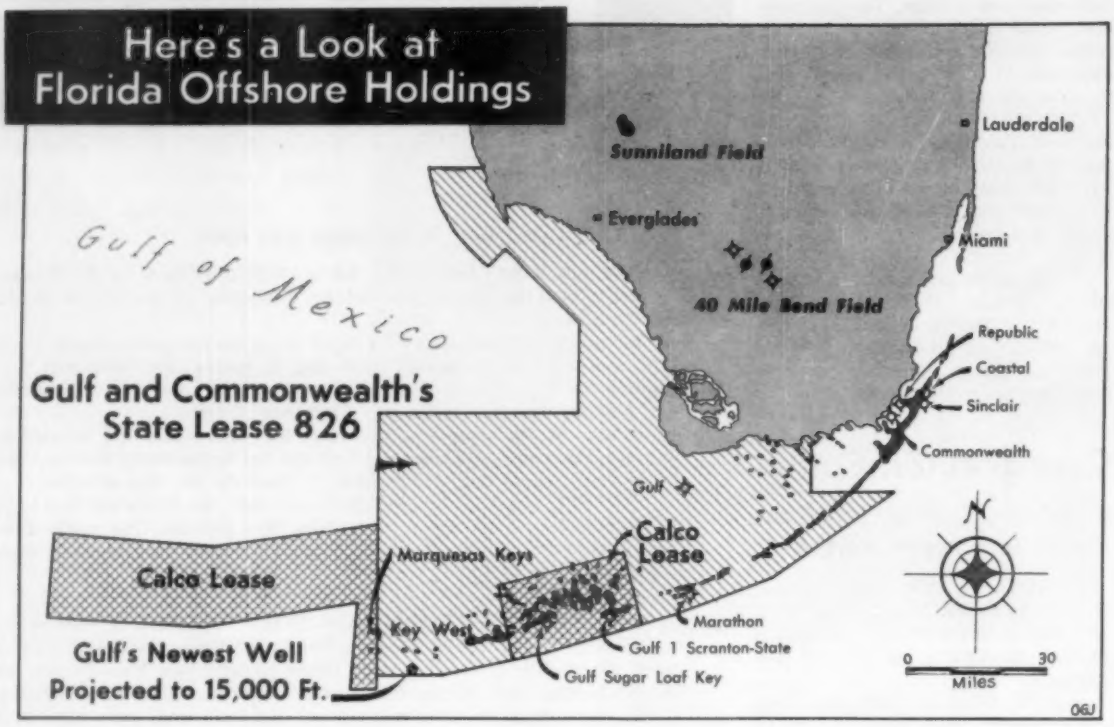
THE LONG WAIT MAY PROVE WORTHWHILE for Midwestern and Tennessee. If their current plan is approved, they will be able to deliver to the Chicago-Gary area far more gas than they proposed earlier.

The first application called for Midwestern to move about 200 million cubic feet of domestic gas, plus a similar volume of Canadian gas going to markets north of Chicago. The present plan calls for first-year sales of 260 million cubic feet with the volume increasing to 360 million in the third year of service.

Instead of selling directly to industrial plants, as proposed in the earlier plan, Midwestern now hopes to sell gas to three Chicago-area utilities for distribution to both industrial and residential customers.

Although the importation of Canadian gas has been delayed, Midwestern is still pursuing this phase of its proposal. Just as it has joined forces with utility interests which formerly opposed its "invasion" of the Chicago market, Midwestern now is making allies out of former competitors for markets north of Chicago.

Michigan Wisconsin Pipe Line Co. has agreed to purchase 158 million cubic feet per day of Canadian gas from Midwestern. The FPC already has indicated it would look with favor on use of Canadian gas for the area if an export permit can be obtained.



Oil Men Still Gambling in the Keys

• Gulf is making its fourth try along the Florida Keys in a 15,000-ft. wildcat. Five other firms also have struck out in the offshore search.

A VAST 3 million-acre lease is undergoing a new test in the long search for oil in the offshore waters of southern and southwestern Florida.

For many years some of the nation's biggest oil producers — Gulf, Humble, The California Co., and others—have studied the geology of the area. Some have sunk heavy money in drilling. None has found commercial oil.

But the latest effort shows there is still confidence that offshore Florida has oil and that the search will continue.

Furthermore, new acreage may be opened up by the federal Government and thus extend the search seaward to the west.

The new test . . . Gulf Oil Corp. is making the newest test off Florida with a 15,000-ft. well, one of the deepest ever drilled on huge State Lease 826, a 3,013,406-acre expanse divided into 26 blocks.

Gulf has contracted with Kerr-McGee Oil Industries, Inc., to make a Jurassic test at a site 15 miles west and slightly south of Key West in the Florida Keys. Commonwealth Oil Co., Houston, is a participant in the lease.

Last week Kermac's Rig 45, lately towed from Louisiana, was drilling below 4,300 ft. and planned to reach the projected 15,000 ft. by early summer.

The lease . . . The history of State Lease 826 is a long one. However, like other offshore leases, it has become involved in the federal-state offshore dispute.

There is no question of its status now except for the portion which lies beyond 3 miles of Florida lands. And the U. S. Supreme Court will settle this matter when it rules on the celebrated Gulf of Mexico boundary dispute, perhaps next fall.

Efforts to nail down the lease began as far back as the early 1940's, and finally in 1951 the arrangement under which Gulf and Commonwealth hold the acreage was reached.

The Internal Improvement Fund, a Florida state agency which handles oil leasing, granted a 10-year lease starting September 18, 1951. It was granted in Gulf's name. Gulf, in an agreement with Commonwealth, held three-fourths of the lease rights and assumed the drilling obligations. Commonwealth held the other one-fourth.

The lease contract required that at least one 6,000-ft. well be drilled each 5 years on each of the 26 blocks, but subsequent changes and extensions have altered this requirement.

Gulf and Commonwealth also have altered their agreement. With Gulf going to 15,000 ft., Commonwealth will hold a one-eighth interest in the nine westernmost blocks in the lease and Gulf seven-eighths. Most of the acreage in the nine blocks lies outside the 3-mile limit—but not the site of the new well.

Also, Gulf obtained from the Internal Improvement Fund a 5-year extension of the 10-year lease on the nine western blocks because it agreed to drill to at least 12,000 ft. in the latest test. The extension period began March 1.

An extension also was granted on the other 17 blocks in the lease. Most of these blocks straddle the 3-mile line and therefore may be affected by the Supreme Court's federal-state boundary ruling.

The period of extension for these 17 blocks will be equal to a period from November 7, 1957, to the date of the final decision of the Supreme Court. This period would be added to the period of the 10-year lease.

Past drilling . . . At least eight dry holes have been drilled along the Florida keys in the past, three of them by Gulf.

Gulf's 1 Scranton-State on Big Pine key went to 15,455 ft. before giving up. The 1 Scranton-State and another dry hole, Gulf Sugar Loaf Key, were drilled on leases now held by Calco.

Five other companies also have tried, among them Commonwealth and Sinclair. But none has found pay in the tempting but, so far, disappointing offshore area.

On the Florida mainland, Humble Oil & Refining Co. has the state's only commercial production at its Sunniland field. Gulf and Commonwealth each completed a producer in 1954 in 40 Mile Bend field, but neither was commercial and both were shut in within a short time. Two dry holes also were drilled in the field.

Other holdings . . . In addition to State Lease 826, The California Co. has extensive holdings in the Keys area, and Commonwealth has a big lease along the northwestern coast.

Commonwealth's acreage is State Lease 833, consisting of 875,000 acres. It extends from the western tip of Florida near Pensacola eastward and southeast to Apalachicola Bay. The seaward limit is 6 miles from shore. It includes also two large bays, Pensacola and Choctawatchee.

The 10-year lease expires Dec. 6, 1961. Gulf and Humble have drilled two dry holes on it. Gulf abandoned one well at 6,063 ft. in January 1954, and Humble the other at 7,505 ft. in October 1956.

The Calco lease is broken into two blocks totaling 734,760 acres.

One portion, about one-third of the total, stretches along the Keys east to Key West, while the other is seaward to the west. Part of the western portion extends into the area which the federal Government also may lease.

The lease contract runs to Sept. 13, 1965, but the company must drill a 6,000-ft. well by Sept. 14, 1960, to keep the lease alive.

Federal leasing . . . Whether the U.S. Bureau of Land Management will hold a lease sale soon for Florida offshore lands is unsettled.

The bureau invited nominations last fall on 458,000 acres in the Marquesas area west of State Lease 826. The only response prior to the February 1 deadline came from Calco, which nominated some 346,000 acres for bidding.

Much of California's nomination consists of the same land it holds under lease from the state of Florida. The state claims its boundary to be 3 leagues seaward, and the U.S. says the boundary is 3 miles.

When the Interior Department's Land Management Bureau asked for nominations on the big tract, it was expecting the Supreme Court to settle the boundary argument this winter. However, the court has chosen to hold off its decision until next fall or later, and this has thrown a wet blanket over the projected sale.

The bureau also may be holding up the sale for the simple reason that little interest was shown in it by the industry.

When the boundary case is decided, interest may perk up and offshore Florida may get a better break.

Big Alaska Program Planned

. . . by General Petroleum at Bristol Bay. Rig is readied for first test after Interior approves development contract.

GENERAL Petroleum Corp. plans a multiple-well drilling program on a block of about 455,573 acres in southern Alaska.

An oil and gas development contract approved by the Interior Department provides for spudding the first well this year. The company is already preparing to move a rig to the area.

The contract covers acreage in the Becharof-Egegik area in the Bristol Bay region on the north side of the Alaska Peninsula. The area is about 300 miles southwest of oil production on the Kenai Peninsula.

General Petroleum will be allowed to retain development rights on up to 50% of the area covered by the contract. The company will be allowed 2 years in which to select the acreage it wishes to keep. Retained lands are to be in a "reasonably compact" area.

Who's involved . . . Prior to approval of the contract, General Petroleum made an agreement with a group of companies with extensive holdings on the peninsula.

Group includes Great Basins Petroleum Co., Reserve Oil & Gas Co., Monterey Oil Co., Ambassador Oil Corp., Texota Oil Co., Hudson Gas & Oil Corp., and Republic Natural Gas Co. General Petroleum and Great Basins concluded an extensive joint geophysical and geological study of the area last summer.

By drilling a well a year during life of the new contract, General Petroleum will be able to pick up additional acreage from the group.

First well . . . General Petroleum is preparing to move a Rowan Drilling Co. rig from the Bear Creek unit on the east coast of the peninsula about 65 miles to the Bristol Bay area.

The rig drilled Humble Oil & Refining Co.'s 1 Bear Creek which was abandoned this winter at 14,373 ft. Location of the new test hasn't been announced yet.

Contract details . . . The first well must be spudded this year unless the company cancels the contract for failure to obtain commitments covering 85% of the lands or accepts a smaller percentage of the lands. General Petroleum has 6 months to obtain necessary commitments.

During the second year of the contract, General Petroleum is to spend at least $150,000 in exploration or drilling. This sum is in addition to the cost of the first well.

The company also would be required to drill a well during the third year of the contract and another during the fourth year.

General Petroleum was granted 2 years in which to select its acreage "because the area involved is not susceptible to dependable magnetic or seismic exploration." Interior Sec. Fred A. Seaton pointed out that a volcanic layer prevents this type of exploration.

It is estimated that the first well will be drilled to about 10,000 ft. or more to obtain the desired stratigraphic data.

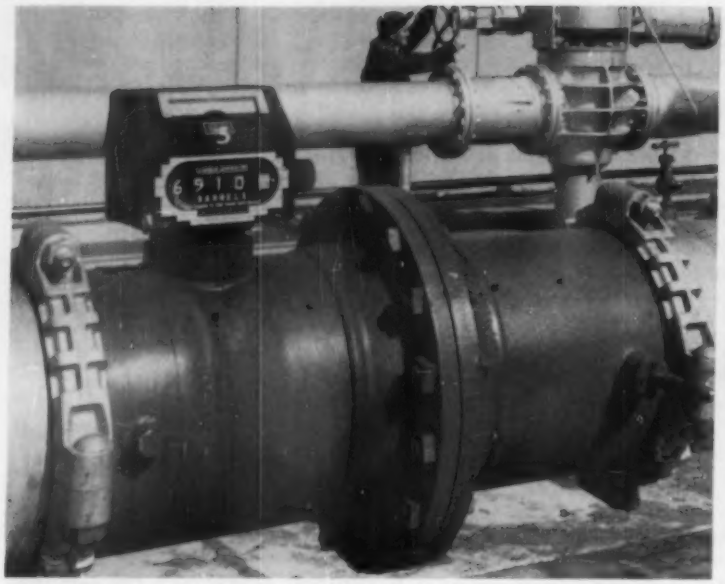
The contract will permit General Petroleum to exceed the usual Alaska acreage limitation of 100,000 acres of federal lands.

General Petroleum's developments area is divided into two parts. The Becharof district covers about 253,103 acres, and the Egegik district contains about 202,470 acres.

The area is the third for which Seaton has announced approval of a development contract this year.

Richfield Oil Corp. recently was granted a development contract covering some 490,000 acres in the Katalla-Yakataga area (OGJ, Mar. 16, p. 112).

Union Oil Co. and Ohio Oil Co. were awarded a contract covering 299,000 acres in the Knik Arm area.



NEW 16-IN. meter in operation at Rockwell's Murrysville, Pa., test station.

OPEN METER shows delicate rotor blades.

New Meters Measure Big Volumes Fast

• Turbine-type meters handle as much as 20,000 bbl. an hour with remarkable accuracy. Latest is Rockwell's 16-in. meter which measures crude or products of varying viscosity at rates up to 15,000 bbl. an hour.

GREAT CHANGES are taking place in the methods of measuring petroleum.

There are two aspects to this important trend:

. . . **Metering** is replacing tank gaging as a means of measuring crude oil and refined products.

. . . **A new type of meter** has been developed for flow rates much higher than can be handled by positive-displacement meters, which are accepted in low to medium-flow ranges.

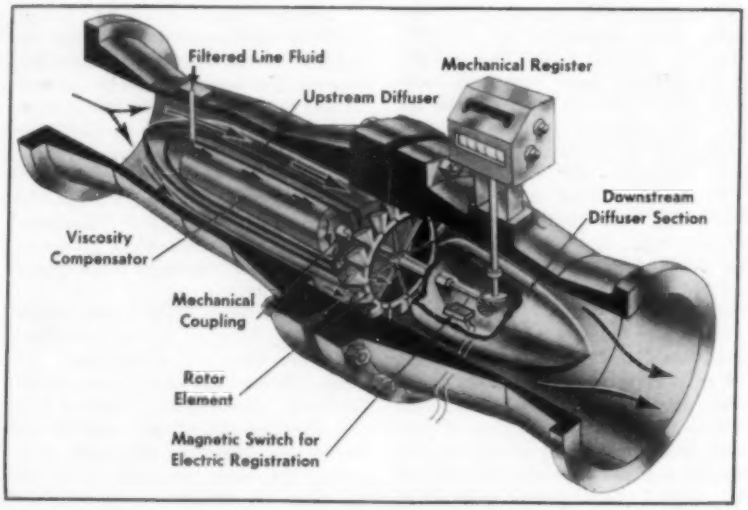
This new meter which is moving into the petroleum industry is a turbine type. It has had prototypes in such diverse applications as missile fuels and water measurement.

Its accuracy, reliability, and sharply reduced cost are fast erasing the skepticism which the first models met. It appears to solve the problem of measuring the big volumes moved at high flow rates in large trunk lines and at marine terminals.

The turbine meter is considered a significant breakthrough for the 10,000-20,000 bbl. per hour flow ranges. But it works well at lesser rates, too.

Its first entry in the industry was in products measurement (OGJ, April 14, 1958, p. 67). The turbine meter was measuring 10,000 b.p.h. in a test with a p.d. meter. It has also proved its application for measuring products in the 1,430-4,500-b.p.h. range (OGJ, Sept. 22, 1958, p. 83).

In the past year turbine meters have been installed on crude lines, and recently a model with capacity of 20,000 b.p.h. was delivered for a terminal (OGJ, Jan. 19, p. 151).



METER DESIGN provides for automatic correction for varying viscosity of different liquids being measured in the Rockwell unit. Some line fluid feeds through a compensator, which puts a varying drag on the delicate turbine rotor as viscosity changes.

New turbine meter . . . The latest development in the trend is the introduction by Rockwell Manufacturing Co., a p.d. meter manufacturer, of a 16-in. turbine meter.

It will accurately measure crude and products of varying viscosities at flow rates up to 15,000 b.p.h.

The meter will be on public display for the first time at the International Petroleum Exposition in Tulsa May 14-23.

Trade journal editors were given a "sneak preview" at the Rockwell plant in Pittsburgh earlier this month. They saw the meter handle flow rates ranging from 3,734 to 13,394 bbl. per hour of 30° API gravity oil in five separate tests.

The widest variance was .036%, an impressive indication of the meter's repeatability.

In field tests, some 35,000,000 bbl. of crude oil was metered by a single turbine meter without change in calibration or meter factor and without visible wear of any component.

The turbine meter is the product of almost 5 years' research by Rockwell and several major oil companies. It weighs only 1,000 lb. It is 42 in. long and 20 in. high from the center line of the pipe. Its inside diameter is no larger than the line in which it is installed.

Meter characteristics . . . Here are some of the meter's outstanding operational characteristics, listed by Rockwell:

. . . **Accuracy** of better than 15 parts in 10,000.

. . . **Repeatability** of better than one part in 5,000.

. . . **Cost less than one-half,** weight less than one-eighth of p.d. meters of equal capacity.

. . . **Calibration frequency** reduced below p.d. meters.

. . . **Switch from crude to products** without need for adjustment.

Design features . . . The Rockwell meter has three interesting design features:

. . . **A rotor metering element** which weighs only 4 lb.

. . . **A viscosity compensator.**

. . . A **magnetic coupling** completely sealed from the line product.

The metering element is a ball-bearing suspended turbo-rotor. The rotor blades are specially designed, low-drag, air-foil sections upon which the liquid impinges. It is so delicate in response that a person blowing into the open end of the meter will rotate the metering element.

The viscosity compensator is mounted on the upstream end of the rotor shaft. It provides a viscous brake effect to impose mechanically a drag on the turbine rotor.

Since the drag is directly proportional to the viscosity of the liquid, it fixes the amount of turborotor slippage and maintains a constant relationship between the flow velocity and the rotor speed, regardless of viscosity.

A small portion of the full line flow is continuously fed through the viscosity compensator to provide a continuous viscosity correction.

A fork-shaped magnetic drive is mounted on the downstream end of the turbo-rotor shaft. It can be used to transmit power magnetically to either a mechanically conventional register or to an electrically actuated register system.

The meter was demonstrated at the Murrysville, Pa., test station, where the company's meters will be calibrated.

Allowable Trimmed

in Texas when commission cuts schedule to 11 days.

TREADING carefully while going into the traditional refinery turnaround season, the Texas Railroad Commission cut back the crude allowable for April to 11 days.

This will pare the initial April allowable back to 3,065,472 bbl. daily—73,093 bbl. below the initial allowable for March and 97,955 bbl. under that in effect March 7.

The commission's decision appeared to be tuned closly to stocks and demand testimony by major company executives just prior to the allowable hearing. Concensus of this testimony was that the industry should experience a good year if it doesn't overproduce or run too much to stills in the next few months.

Contrary to last month, nominations by major purchasers were spread rather widely.

Gulf, still bothered by stocks swollen during its recent Port Arthur refinery strike, asked for only 9 producing days. On the other end, Humble, Sun, and Texaco sought 12 days.

ALLOWABLES BY DISTRICTS

District	April	Change from March 7
1. Southwest	55,119	− 391
2. Gulf Coast	122,863	− 5,006
3. Gulf Coast	398,708	−12,001
4. Southwest	211,094	− 7,394
5. East Central	34,200	− 1,281
6. Outside East Texas field	131,643	− 5,272
6. E. Texas field	155,045	− 6,570
7-B. N. Central	184,959	− 4,842
7-C. W. Central	148,696	− 5,521
8. W. Texas	1,191,939	−46,361
9. N. Texas	281,443	− 4,225
10. Panhandle	149,763	+ 909
TOTAL	**3,065,472**	**−97,955**

Incentives Urged

to make offshore activity in Louisiana profitable.

LOUISIANA can keep its oil industry healthy by going to wider well spacing and by raising offshore allowables.

This is the opinion expressed by H. C. Teasdel, president of The California Co., the API Division of Production's southern district meeting at New Orleans last week.

Teasdel said that the disparity in offshore costs and offshore allowables is the thing that has taken so much of the profit from offshore operations. It's the reason, he said, that there were 119 rigs working in the gulf last July but only 34 in January.

Spacing . . . Teasdel suggested an incentive plan for wider well spacing in the state.

He said it would do much to relieve the difficulty of allocating oversupply to underdemand.

As an example, he used a plan whereby a well on 40 acres would receive one and a half times the allowable of wells on 20 acres. Further, an 80-acre well might get one and a half times the 40-acre allowable. In such a case, the daily crude run might be only nine-sixteenths as much with 80-acre spacing as with 20-acre. Yet, the return per dollar invested would be more than twice as good on the 80-acre plan.

Offshore . . . In discussing offshore economics, Teasdel said that in 1953 an 8,000 to 9,000-ft. well onshore had an allowable of 215 bbl. per day.

A similar well offshore had an allowable of 465 bbl. per day. Since then, the spread has so narrowed that the same offshore well this month is producing 141 bbl. per day compared with 81 bbl. per day for the onshore well.

For onshore wells, Teasdel said, allowables go up in perfect step with the cost of the well. That is, it works out so that a deep, expensive well gets about twice the allowable as a shallower well which normally costs only half as much to drill.

The same isn't true offshore. The deep overwater well which costs three times as much to drill might only get one and a half times or twice the allowable.

Under the older offshore allowables, Teasdel said, the oil companies pumped millions of dollars into the area and the whole economy of Louisiana was thereby stimulated.

NOLA I drills ahead without a hitch off Louisiana, with . . .

WELLHEAD equipment above the surface.

Ship-Side Drilling Is Successful

• Zapata's converted tender is the first floating drill ship to operate in Gulf waters. There's been no problems so far, and even heavy seas didn't halt drilling on CATC development well.

THE FIRST full-floating drill ship ever to look for oil in the Gulf of Mexico was below 5,000 ft. last week on what may become the first producer drilled from such a vessel in these waters.

Zapata Offshore Co.'s Nola I, a converted YF barge, was drilling ahead smoothly on CATC's Well 7 in the Block 84 field of Louisiana's West Delta area. This development well is scheduled to drill to 10,000 ft.

Both Zapata and CATC officials are confident that the well will be completed without difficulty if production is found. Nola I has already had a "shakedown" on the 9,025-ft. dry hole it completed for Zapata's own account just before moving onto the CATC location.

Nola I is drilling in 26 ft. of water. Water depth at the previous location was 30 ft. Heaviest seas since operations started on the first location February 12 whipped up 7-ft. waves. During this "blow" Nola I took a 5°-roll briefly. In spite of this, drilling continued uninterrupted. Zapata officials say they still do not know just how heavy seas will have to get in order to stop operation.

There is no platform of any kind on the present location, nor was any used on the first well. Blowout preventers and other wellhead equipment are supported on the surface casing. Zapata and CATC say that no platform is needed. If the well finds oil, a protective jacket might be set.

Nola I's only attachment to the ocean floor is through eight 10,000-lb. anchors. Four of these fan out from the bow and another four from the stern.

Such a vessel, Zapata says, can move rapidly from one location to another. It can drill in deep or shallow water. Soft bottoms should be of no concern. Moreover, Nola I can set a production structure where necessary.

There has been no particular trouble in drilling, making connections, making round trips, or in running casing. If changing tides and currents in the area move the vessel enough that the rotary table is not directly over the wellhead, a link or two can be taken up or let out on the anchor chains. This is not necessary often and takes only a few minutes.

Besides the fact that it sits amidships a floating vessel, Nola I's rig is mostly the same as any other deep-drilling rig.

One fairly unusual thing about the hole-making machinery is a track inside the 142-ft. derrick. This track, made of two channel irons braced together ladder-fashion, fits a guide bracket welded onto the traveling block. The block rides the track from top of the derrick to the floor and, thus, cannot sway even in the event of heavy rolling by the ship.

Drill pipe is racked in the derrick in conventional style.

Same rig as before . . . The rig on

Nola I today, a National 130, is the same one for which this vessel served as a tender for several years.

Nola I was the first offshore equipment acquired by Zapata when it began operations more than 4 years ago. At that time, there was a brisk demand for floating tenders. These vessels, mostly converted LST's and YF's, serve drilling operations on a small platform to which the tender is tied.

To convert Nola I from tender to floating drill ship, Zapata installed a large steel cantilever substructure amidships. This substructure supports the rig and derrick over the port side. To counterbalance this weight, a large ballast tank, or sponson, was added outside the regular hull on the starboard side.

As weight supported in the derrick changes with drilling, water is pumped to or from this ballast tank to keep the vessel in trim. Also, Nola I has regular double-bottom tanks which can be filled or pumped out if need be.

The deck space occupied by rig and engines was used for pipe storage when Nola I was a tender. Drill pipe and casing are now stored on the deck on either side of the rig. The mud pumps sit on the deck below in space formerly used primarily for mud storage. Mud is still stored on this deck since only a small part of the storage area was given up to the pumps.

Making a trip . . . Power for drilling comes from three large diesel engines which sit in the conventional spot behind the draw works. These drive the rig and the mud pumps, two National C-350's, through a chain compound.

During a round trip, the drill pipe is racked in the derrick. Special "fingers" in the derrick prevent movement of the stands while parked. In addition, the derrickman chains the upper end of the racked pipe to the derrick.

Crewmen say that the guide track on the traveling block does not slow them. They can make a round trip from 6,000 ft. in about 4 hours.

As pipe is pulled from the hole, it is racked farther out from the center of the vessel than where it hung in the rotary. For this reason, when the trip starts, the motorman begins pumping ballast to the other side of the vessel for counterbalance. Then, when the pipe starts back into the hole, the ballast is pumped back.

Because the traveling block is fastened to its guide, making a mousehole connection is not as easy as it would be otherwise, particularly in heavy seas. For this reason, Zapata has installed equipment for a power swivel. With this equipment, it will be possible to drill down three-joint stands instead of singles.

Moreover, the drill string will not be bound by the rotary table, thereby easing any pounding action there might be on the bell nipple atop the wellhead.

Not extended yet . . . Zapata officials say that the Nola I has not yet been called on to really extend itself.

The 10,000-ft. hole presently drilling is well within the depth capacity of the rig. The seas have not been rough enough to cause much trouble. The water depth is too shallow to be a problem.

Zapata says Nola I will drill in waters 200 ft. deep. In the deeper water, a tripod structure it pioneered on wells along the Texas coast will be used. Drilling takes place through a perpendicular leg of the tripod.

Zapata proposed low-cost, single-well tripod would place the wellhead high enough above water that it would only occasionally be washed by waves. Atop this tripod could be added area above maximum wave action for production equipment and the like.

Several individual vertical wells completed in this manner, the company figures, would be cheaper than drilling directional wells from a platform or attempting ocean-bottom completions.

LPG Pilot Project Approved

A PILOT miscible drive, which could grow into one of the largest LPG floods yet, will be launched by Magnolia Petroleum Co. in South Texas' big La Gloria field.

The Texas Railroad Commission has approved Magnolia's plan to carry out the project in the relatively small Atlee "A" reservoir in the multipay field. Magnolia is operator of the La Gloria unit.

Plan is to inject LPG and chase it with gas under a pilot area of about 60 acres. Operator will inject about 1,000 bbl. of LPG daily through two input wells.

Magnolia expects to recover 272% more oil through miscible drive than by primary production to depletion. The 7,100-ft. Atlee "A" reservoir takes in about 788 productive acres. It is one of about 30 reservoirs in the field. If the pilot performs as hoped, the unit likely will go the miscible route in some of the field's larger reservoirs, such as Loma Blanca pool which takes in thousands of acres.

the JOURNAL *said . . . . . .*

50 years ago

March 20, 1909

A yard locomotive of the Texas & Pacific railroad has been equipped to burn oil and if results are satisfactory, passenger engines also may be converted to oil.

The state of Texas has no right to issue mineral leases on two tracts of land in San Jacinto bay, Texas, near Goose Creek, the Texas Supreme Court ruled in denying lease request of F. J. DeMeritt of Houston. In eyes of the law, the court ruled, the tracts are not land but water.

Mexican government engineers report the burning oil well 60 miles southwest of Tampico last summer made oil at the rate of 150,000 bbl. daily. Extreme height of the flames was 1,500 ft. Studies are still being made of the well, drilled to 2,005 ft.

25 years ago

March 29, 1934

The Journal's annual refining survey shows there are now 628 U. S. refineries, 483 of which are operating. Sixty were completed during 1933. Total capacity of operating plants is now 3,790,593 bbl., up about 100,000 bbl. over a year ago. Texas has 209 operating refineries.

Organization of Standard-Vacuum Oil Co. has been completed, merging assets of Socony-Vacuum Corp. and Standard Oil Co. of New York.

A new Texas law giving the Railroad Commission supervisory authority over refineries is upheld in district court.

Signal Oil & Gas, Associated Oil, and 41 other companies and individuals are indicted in Los Angeles for selling gasoline under posted prices in violation of the Petroleum Code.

10 years ago

March 31, 1949

Use of "every available geologist" to speed discovery of new fields, plus an all-out program to develop a synthetic-fuels industry is recommended by Interior Secretary Krug. "Petroleum is our most critical problem," he said.

R. W. McDowell, executive vice president of Mid-Continent Petroleum Corp., is elected president of the Western Petroleum Refiners Association. New directors are W. J. Carthaus, Harry J. Kennedy, and Brown Meece.

The Haifa, Palestine, refinery of Consolidated Refineries, Ltd., has been handed over to British management by the Israeli Government. The 83,000-bbl. plant had been shut down as a result of Jewish-Arab fighting. Staff will be expanded to 2,000.

Senate Fumes Over Oil

. . . and Proxmire offers a bill to kill the imports plan, says he'll use this "price guarantee" to fight depletion.

THE NEW OIL-IMPORT program ran into more opposition from Congress last week. Criticism centered not so much on import restrictions as on the oil industry itself.

Sen. William Proxmire (D-Wis.), one of the industry's most vocal critics, joined the attack by introducing a bill to abolish the import quotas.

A coal-state senator defended President Eisenhower's imports order but warned of threatened price increases on residual oil.

"As the past has proved," said Sen. Jennings Randolph (D-W. Va.), "residual rates will be raised quickly and substantially if conditions permit." He blamed foreign oil for mass unemployment in coal-producing states and expressed the belief that imports "are dumped, ruthlessly and unfairly."

"The Congress should investigate reasons why the Department of Justice civil suit against five large petroleum companies, alleged in violation of the antitrust laws through the division of markets and the fixing of prices, has remained inactive since it was filed approximately 6 years ago.

Earlier, removal of the import controls was urged by Sen. George D. Aiken, (R-Vt.) and a trio of Democratic senators, Wayne Morse of Oregon, S. L. Holland of Florida, and John O. Pastore of Rhode Island.

Proxmire's bill . . . This would rescind the recent import order. It also would authorize Congress to block any similar orders in the future by a majority vote in both Houses within 60 days after the order was issued.

"The oil industry has won a position of excessive and corrupting power and influence in our federal Government," the Wisconsin senator charged.

"The favorable effect this presidential action will have on oil investments and profits is just the latest instance in a series of immense political privileges for oil featured by the lushest tax giveaways any American industry has ever enjoyed."

Unless the import order is reversed, Proxmire said, the precedent "will encourage an even greater incentive for political influence by the number one special interest in American politics today."

Anti-depletion fodder . . . Proxmire, one of the leading opponents of the 27½% depletion allowance, made it clear he plans to use the new imports restrictions as a weapon in his depletion fight, which is expected to develop later in the session.

The presidential action on imports, he charged, "adds the guarantee of a higher and more profitable price to the juicy and stable after-tax profits federal tax concessions have permitted the oil industry."

"Has any American industry ever enjoyed such a super-combination bonanza at the expense of the taxpayer and the consumer?" Proxmire demanded.

House upset, too . . . In the House, Rep. Charles A. Vanik (D-Ohio) charged that the President's imports proclamation "is without question the most inflationary and arbitrary action executed by the President during his term of office."

"The obvious purpose of the executive order," he added, "is to prop up and support the domestic prices of oil and petroleum products in a sagging world market."

Rep. Tom Steed (D-Okla.) countered the trend by introducing a bill to provide permanent controls.

Although describing the present program as "a big step in the right direction," Steed pointed to the threat that import quotas might be increased if "big importing companies" force domestic prices up.

At his presss conference, President Eisenhower reassured critics of the import restrictions that his administration plans to keep a close check on domestic oil prices.

The threat of government "surveillance" of oil prices meant, he said, that a continuing study would be needed "to see whether or not the security of the nation did demand any increased prices."

New quotas issued . . . Amidst the political furor surrounding the new import program, Capt. Matthew V. Carson, Jr., prepared to expand the program to cover imports of finished petroleum products.

Company quotas for finished products, scheduled to be announced this week, will go into effect April 1.

Carson, as administrator of the import program, also has granted additional quotas for crude and unfinished products to 12 small refiners. The new allocations total about 3,600 bbl. daily. They bring total quotas assigned so far to slightly over 940,000 bbl.

Gilsonite Used in Cement Jobs

. . . as excellent weight reducer for slurries. Halliburton says granulated material is one of best new additives.

GILSONITE—that solid hydrocarbon now being mined and refined into liquid petroleum products in Utah—is turning out to be something more than a minor raw material.

The freak of nature is getting to be a marketable product in its natural state.

Latest use for the asphaltite is as a weight reducer for oil-well cement slurries. According to two scientists with Halliburton Oil Well Cementing Co., it is one of the best new materials for this purpose.

Knox A. Slagle and Gregory Carter of the company's Duncan laboratory gave results of using gilsonite at last week's southern district meeting in New Orleans of the American Petroleum Institute's Division of Production.

What it does . . . The Gilsonite, Slagle said, is getting 80 to 90% fillup on casing jobs where older types of lightweight slurries get only 50 to 60%. Thus far, more than 200 field tests have been made with the material.

Not only does gilsonite—granulated but otherwise unprocessed — reduce slurry weight as low as will any other commercial additive, but it also makes a stronger set cement.

Specific gravity of the material is hardly more than water. Moreover, it is inert to the corrosive matter in well fluids and cementing materials. It is also nonporous and impermeable.

Part of its effectiveness in getting good fillup on cement jobs, Slagle said, is due to the fact it is an excellent lost-circulation material. As a result of this formation-sealing ability, it has been possible, he reported, to cement in a single stage many strings in areas where lost circulation had made two or more stages necessary in the past.

Needs little water . . . Other weight reducers, Slagle said, depend on making the slurry tolerate large volumes of water.

Gilsonite works in an entirely dif-

ferent manner. The solid particles of gilsonite take the place of excess water. Thus, the set slurry is stronger.

The material also seems to have a scouring action on the walls of the hole as it's pumped in. This action removes mud and filter cake from the formation face, insuring a better cement job without the necessity of block squeezing. Also because of this scouring, Slagle said that no bottom-cementing plug should be necessary.

He advised against using more than necessary of such wall-cleaning devices as scratchers to minimize the possibility of restrictions in the annulus.

Certain precautions are necessary because of the good bridging qualities of gilsonite, Slagle said. Because it has a low specific gravity, it may float and accumulate in a low-viscosity slurry.

For that reason, water should be used ahead of the slurry. This will prevent dilution of the slurry and reduction of its viscosity. Slagle recommended a bentonite-water mix as best for this purpose.

New Flood Method

uses a chemical ahead of water to make oil mobile.

A NEW WATER-FLOOD method used in the Mildred pool, Navarro county, Texas, has resulted in recoveries four times those of conventional water-flooding practices, Hydrocarbon Chemicals, Inc., the developer, claims.

In the so-called "vamp" method, a mobilizing agent is introduced ahead of the water flood. The agent, a fluid chemical, is not further identified because of pending patent procedures.

While the method has proved successful in a shallow field producing a low-gravity crude, its value in a deeper field with a higher gravity crude is yet to be determined.

The vamp process differs from miscible phase flooding in that the mobilizing agent does not go into solution with the crude oil except to a minor degree. It does have the effect, according to its developers, of increasing the mobility and decreasing the viscosity of the oil in place.

Paul N. Belmont, Hydrocarbon president, says the process is being used successfully on the company's 1,800-acre property in the Mildred pool. He said since Hydrocarbon took over the property 2 years ago, the average production has been increased from 1 to 7 bbl. per well per day by conventional water flooding.

In the pilot well, using the vamp method, production has been brought up to 27 bbl. per well per day.

Fire Floods May Revive Pools

. . . in shallow Cisco sands of North Texas where primary heavy-crude recovery is poor, speaker tells producers.

IN SITU COMBUSTION may be the answer to hiking recovery from many of North Texas' shallow Cisco (Pennsylvanian) sands.

Best candidates, North Texas oil producers were told last week, are Cisco pools which, because of viscous, low-gravity crude, have been poor primary producers.

Speaker was John F. Buckwalter, Ryder Scott Co., Wichita Falls, at the annual meeting of the North Texas Oil & Gas Association.

There should be great interest in fire flooding in any area where low-gravity crude is found at reasonably shallow depths. Use of heat in these spots offers new hope in that other secondary-recovery methods have performed poorly in heavy-crude reservoirs.

In qualifying for a successful fire flood, gravity of the oil should fall somewhere between 13 and 25%.

A prospective reservoir, in order to qualify, also should have:

. . . **Porosity above** 20% (above 25% preferred).

. . . **Permeability** over 100 md.

. . . **Oil saturation** in excess of 1,000 bbl. per acre-foot of payzone.

. . . **Pay thickness** of at least 15 ft.

. . . **Depth** less than 2,000 ft.

. . . **Area** of at least 100 acres.

Not for light crudes . . . In other pools containing lighter oils, fire flooding is not attractive, he said.

Research and field work to date, he said, show that such projects will produce a probable maximum of 50% of oil in place in a reservoir. Though the fire flood sweeps clean, it burns less than half of the reservoir sand volume.

The method thus isn't economically competitive with a water flood in light-oil pools, Buckwalter said, because the water flood can get about the same amount of oil at far less cost.

Costs spiral in fire flooding due to the need for large air-compression capacity, for using stainless steel liners and pipe because of high temperatures and excessive corrosion.

Producing wells sometimes suffer from oil-water emulsions which form at the time of greatest oil production, or they may sand up. These pitfalls influence prudent operators to use special liners and/or gravel packing, which also add to costs.

Gas Export Is Approved

. . . by Alberta board. Proposal to move gas to U.S. must now get approval of Alberta cabinet, federal board.

THE ALBERTA OIL and Gas Conservation Board has recommended that the Alberta government approve the export of 3.1 trillion cubic feet of gas to the U. S.

Next step in the bid by Alberta & Southern Gas Co., Ltd., and Westcoast Transmission Co., Ltd., to move Alberta gas to the U. S. is approval by the provincial cabinet. Federal approval is also required.

The conservation board recommended that Alberta & Southern be given the right to export 2.3 trillion cubic feet at a maximum daily rate of 400,000 M.c.f. Deliverability would be assured for about 17 years.

In its application, Alberta & Southern sought 4.2 trillion cubic feet, at a suggested daily volume of 460,000 M.c.f.

The board recommended that Westcoast be allowed export of 800 billion cubic feet at a rate of not more than 165,000 M.c.f. per day.

Westcoast had asked for export of 1 trillion cubic feet at the recommended daily volume.

Officials of Alberta & Southern, would not comment on the announcement without further study.

George McMahon, vice president of West Coast, expressed satisfaction with the announcement.

He said the recommendation would make the proposed 36-in. joint pipeline from the Alberta-British Columbia boundary to the international boundary at Kingsgate, B. C., economically feasible (OGJ, Oct. 20, 1958, p. 48).

The conservation board, in its recommendations, has left room for additional amounts of export gas if they become available.

Curb on Olefins Looms

. . . for Los Angeles gasoline to reduce smog. It will force refiners to install new hydrogenation, reforming units.

REFINERS who market in the Los Angeles area face some expensive plant changes within the next year.

The situation is this: Los Angeles air pollution control officials claim if the olefin content of gasoline is lowered, smog in the city will be reduced. They soon will ask for an ordinance setting maximum olefin content.

Refiners, for their part, contend that a change in gasoline composition isn't the answer to the smog problem. The cost of refining equipment to reduce olefins in gasoline is high and probably couldn't be regained through higher prices.

More than this, however, they doubt that such a change would have any effect on smog.

Regardless of what's done with fuel composition, there's little hope Los Angeles' smog problem will be solved.

All concerned agree little can be accomplished until an exhaust converter or afterburner is perfected for the automobile.

Best that can be expected from changing motor fuel is preventing smog attacks from becoming worse. Even if auto contributions to smog were reduced by 100 tons daily, the 10% decrease would soon be wiped out by the ever-increasing number of cars and people.

What about olefins? . . . This question probably will be settled soon.

Researchers of the Air Pollution Control District this week are scheduled to recommend to county supervisors that olefin content of gasoline be limited. The maximum olefin content allowed probably will be left unchanged for the time being.

Premium gasolines marketed by majors on the West Coast have olefin content of about 16.6%, and range from about 16 to 19%. This is their content as determined by the fluorescent indicator adsorption method (FIA).

Regular gasolines of large refiners range from about 9 to 28% and average about 13.7. Olefin content of some gasolines sold in the Los Angeles area has run as high as 40%.

The APCD will further recommend, it is expected, that in the next year or so the maximum be lowered to a "reasonable" limit. Refiners would be given this time in which to install the necessary new hydrogenation and reforming equipment.

A one-third cut in olefin content would be costly for the California industry. There's no sound figure available, but the cost could run as high as $75,000,000. One refiner figures such an olefin cut would add 1 cent per gallon to the price of motor fuel.

Different opinions . . . There's still wide disagreement between the oil industry and pollution-control people over the role of olefins.

The APCD claims proof that gasoline can be made less smoggy.

In some 50 road tests carried out in recent months, their researchers found that if a gasoline contained no olefins, the exhaust gases will contain about 10% olefins (bromine number). In other words, fumes of 10% olefins are manufactured in the engine.

Using fuels of known composition, APCD found that as the olefin content of the gasoline increased, so did that in the exhaust. If the synthetic fuel contained 30%, for example, the exhaust would have 40%.

In addition, APCD officials say their studies found a close relationship between the olefin content of the gasoline and its vapors. If the gasoline contains 20% olefins, its vapors will contain a similar amount.

Pollution studies show that on a normal day about 50 tons of hydrocarbon vapors escape from the tanks and carburetors of Los Angeles autos. On a day of 100-plus temperatures, the volume soars to about 200 tons. A less olefinic gasoline thus would mean less olefins evaporated to the atmosphere, APCD claims.

The oil industry, however, holds a different view on the importance of olefins as a cause of smog. In industry-sponsored studies, researchers found that the condition of the automobile has as much effect on smog formation as does fuel composition.

In studies conducted for the Air Pollution Foundation, Stanford Research Institute scientists claim they definitely found "that any practical and economic change in the composition of gasoline used in Los Angeles would not be an effective method of alleviating eye-irritating, ozone-forming smog."

They tested various types of gasoline in different automobiles. Exhaust gases were irradiated for 2 hours and their eye irritation severity then established.

Fuels containing 6, 11, and 25% olefins and a 16% "basin mix" were tested, as well as one containing 52% olefinic compounds. Except for the latter, there was no significant difference in the eye-irritation index of the irradiated exhaust.

Whereas the other had an index of about 9 or 10, that of the 52% olefin fuel had an index of about 16. Thus, only where the olefin content was well above that used in motor fuel was fuel composition found to be of significance.

The researchers, however, did find that olefins influence the eye-irritating nature of smog, and that they react faster under irradiation.

Good correlations were found between eye irritation and the concentrations of certain C_4 and C_5 olefins in the exhaust. Starting with an exhaust which produced little eye irritation after being irradiated, it was found that as various C_4 and C_5 olefins were added the severity of eye irritation increased. Butadiene seemed to be quite effective in producing eye irritation.

PIPELINE BRIEFS . . .

Texas Eastern Transmission has begun construction of more than 1 million barrels of tank storage capacity at Seymour, Ind., to make burner oil available during the peak winter season to midwestern and central U.S. consumers. The first of four steel tanks will be completed in June and the other three before winter. Two of the tanks each will have 325,000-bbl. capacity.

The FPC has revised its map of major natural-gas pipelines in the United States to show existing, authorized, and proposed lines as of Dec. 31, 1958. The five-color map measures about 13 by 18 in. and is scaled to 170 miles per inch. Copies may be purchased at 25 cents each.

Work will start this week in a construction program for New York State Natural in Tioga County, Pennsylvania. Williams Brothers Co. has received a contract to lay 14½ miles of 26-in. and take up 14½ miles of 14-in.

Products deliveries are being made to all Pennsylvania terminals and the Ellsworth terminal in Ohio on the

MISSION executives examine liners moving along an assembly line during the formal opening of the company's new plant. Left to right are Richard White, president; Dudley C. Sharp, Sr., vice chairman; and W. B. Sharp, board chairman.

Mission Dedicates New Plant

• New 4-acre manufacturing center features shorter assembly lines, wide-open spaces, push-button machines.

A NEW manufacturing plant that cuts movement of materials by as much as four-fifths and uses such modern devices as IBM cards to control the size of piston rods is in full operation at Houston by Mission Manufacturing Co.

The big plant—167,000 sq. ft. of unobstructed space—will produce Mission's line of drilling tools, valves, and fluid-end parts for slush pumps.

The production line was the real eye opener during a tour of the plant last week. One product, for example, travels only 900 ft. from the point where manufacturing starts to the point of shipment. At Mission's old plant the same product moved 5,000 ft.

A single supervisor can now oversee the entire process from raw material to finished product.

Mission has added a new wrinkle at its piston-rod production machine. This setup incorporates an IBM machine with punch cards and can, at the press of a button, turn out a piston rod of any desired length or diameter.

The huge plant on Houston's Hempstead Road covers 4 acres, is fully air conditioned, and has a 30-ft. roof.

The interior has no obstructions. Ceiling height is 23 ft., and the other 7 ft. to the roof contains all structural framework and lighting fixtures.

The plant has 300 production units processing 35,000 lb. of metal daily and is equipped with heat treating and electroplating units, including one for chrome plating.

Record Gas Price

is offered for reserves in Louisiana's Bastian Bay.

A RECORD price of 27 cents an M.c.f., including tax reimbursement, has been offered for one of the largest uncommitted gas reserves on the Gulf Coast.

This offer was made recently for gas in Bastian Bay field, South Louisiana, which has uncommitted reserves of 2½ to 3 trillion cubic feet. K. A. McLaughlin of Gulf Oil Corp. disclosed before the Federal Power Commission that the 27-cent proposal was the latest of several offers received. No deal has been made, however.

McLaughlin, who was testifying in connection with the hearings on Transwestern Pipeline Co.'s application for a gas line from Texas and Oklahoma to California, said that 600 billion cubic feet had already been sold in East Bastian A. It went to an intrastate market for 22½ cents plus tax reimbursement.

McLaughlin's testimony confirmed previous reports that Southern California Edison Co., through Tennessee Gas Transmission Co., had sought to purchase Bastian Bay gas (OGJ, May 19, 1958, p. 101). TGT would have transported the gas to California for Edison.

Pan American Petroleum Corp. has the majority interest in Bastian Bay. Gulf and Tidewater Oil Co. are the other operators.

Laurel Pipe Line. Laurel began last week displacing water in the line with product in the remaining section to the Cleveland terminus. The 440-mile 14 to 24-in. system, owned by Gulf, Texaco, and Sinclair, pumps products across Pennsylvania and eastern Ohio from the Philadelphia refining area.

Five pump stations on the Ozark Pipe Line System, which extends from Cushing, Okla., to Wood River, Ill., have been converted to remote control. Five more stations on the crude line remain to be converted under a modernization program begun in 1956. Two stations on the McCamey, Tex.-Houston Rancho system are being converted to remote control and a third will be on remote operation by the end of the year. Both systems are operated by Shell Pipe Line.

A record construction budget of $34 million is planned by Michigan Consolidated Gas this year. The biggest single project will be a 53-mile 30-in. line from near Milford to Elsie, Mich., paralleling two 24-in. lines serving Detroit.

A second 20,000-hp. compressor station costing $6,165,000 will be built at Six Lakes storage field, doubling present capacity. Woolfolk station will be expanded by 8,000 hp. to increase injection and withdrawal of Austin and other nearby storage fields.

Also for Pipeliners . . .

IN THE NEWS: New turbine-type meters can measure crude or products of varying viscosity at rates up to 15,000 bbl. an hour (p. 100).

A complete list of pipeline projects begins on p. 197 in the pipeline construction report.

PLUS THIS TECHNICAL REPORT: United Gas uses gas turbine, ebullient jacket-water cooling (p. 184).

Asphalt Runways Endorsed

. . . and Air Force criticized by House subcommittee. New recommendation may open door to major asphalt market.

ASPHALTIC concrete won a major victory last week in its fight to compete with portland cement for paving runways on military airfields.

In a stinging report criticizing the Air Force's insistence on high-cost rigid pavement, a house subcommittee recommended that asphaltic concrete be specified as an alternate paving material in bids for future runway jobs.

The subcommittee's action promises to open to asphalt a major market from which it had been virtually barred for several years.

Its recommendation in favor of alternate bids was directed not only at the Air Force, which has used cement almost exclusively since 1956, but also at the Army Corps of Engineers and the Navy Department.

The Navy was urged also to coordinate its research with that of the other two services to determine relative merits of asphalt and cement for runways serving planes with extremely high-pressure tires.

What's involved . . . Though the congressional report represented a vote of confidence in asphalt, portland cement still has the edge in competing for some portions of airfield paving.

The armed-service subcommittee, headed by Rep. F. Edward Hebert (D-La.), based its recommendations largely on an asphalt-vs.-cement test conducted last year at Columbus, Miss., Air Force base.

The test showed asphaltic concrete to be adequate for "interior pavements" on runways. But both the Air Force and Corps of Engineers were said to be in favor of a center strip of rigid pavement.

Excluded from the interior pavement are strips 1,000 ft. long on each end of the runway. Portland cement is used on the ends because of the severe blasts and heat to which they are subjected. The center strip, where cement also is given the preference, is about 75 ft. wide and runs the length of the runway.

This leaves about two-thirds of a normal runway open to competitive bids. Under the subcommittee's recommendations, asphalt could be used for a strip about 112 ft. wide at each side of a 300-ft.-wide runway.

Cement apparently will still get the nod for most taxiways and warmup aprons except in extremely cold climates where such construction is considered impractical.

Reactions . . . There is some skepticism regarding the effect of the subcommittee's recommendations, even on interior runway jobs where asphalt is considered competitive.

A spokesman for the Asphalt Institute pointed out that the investigating subcommittee had made a similar recommendation in the past. He said it "remains to be seen" whether the Air Force will carry out the new recommendations.

But the tone of the subcommittee report indicates that congressional probers will insist on compliance with the new recommendations in the name of economy.

It has been estimated that the cost of some pavement jobs can be cut from 25 to 50% by use of asphalt instead of cement.

Reworking Pays Off

as old oiler becomes Wise County's biggest gas well.

BOONSVILLE Conglomerate gas field in North Texas has a new well that dwarfs most of the others in the big 251,000-acre field in Jack and Wise counties.

Ambassador Oil Corp., Fort Worth, has completed its 1 Pruett with open flow potential of 73,000 M.c.f. of gas daily, a record for Wise County. In contrast, average potential of most of the wells in the field is about 5,000 M.c.f. daily.

The 1 Pruett is a reworked oil well 2 miles southeast of the town of Boonsville on a 297-acre proration unit in T. Denson Survey. New gas pay is from Atoka conglomerate perforations at 5,108-14, 5,120-30, and 5,831-50 ft. The well is making 14 bbl. of condensate per million cubic feet of gas.

The Pruett well was originally completed in 1956 as a Strawn sand oil discovery. The hole was carried to 6,114 ft., then plugged back to oil pay at 3,100 ft. The upper sand was squeezed off on the workover job.

The Texas Railroad Commission formed Boonsville Conglomerate field in 1957 by merging 29 fields (OGJ, Oct. 14, 1957, p. 117). The big field now takes in all zones between the top of the Caddo conglomerate and top of the Marble Falls.

PROCESSING BRIEFS . . .

Gulf Oil Corp. will build an oxo alcohol plant at its Philadelphia refinery. Construction is scheduled to begin this summer and be completed next summer. It will quadruple Gulf's capacity for oxo alcohols. It will be the first petrochemical facility at Gulf's Philadelphia refinery. Other petrochemical units are expected to follow.

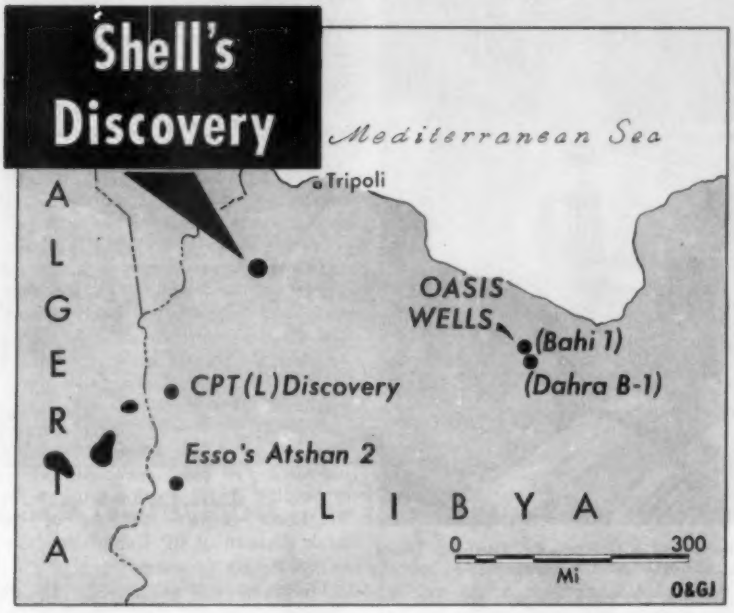
A 1,500-bbl. alkylation unit will be built at Imperial Oil's refinery at Edmonton, Alta. Bids have been called for the $2,400,000 project, and work will probably start by September, with completion expected by April 1960. Gases for the process will come from the 28,500-bbl. refinery itself and from processing plants at Leduc, Redwater, and other fields. The alkylate will be added to gasolines to increase knock resistance.

OCAW has signed 1-year contracts with eight processing and marketing companies in British Columbia, retroactive to January 15. Agreements calling for wage hikes of about 6½% were made with Texaco Canada and Royalite, while 5% agreements were signed with X-L Refineries, Imperial, Shell of Canada, Standard of British Columbia, British American, and Humble Oil Distributors.

Also for Refiners . . .

IN THE NEWS: OCAW wins Indiana Standard vote, loses at D-X Sunray (p. 93) . . . Demand in 1959 to take a 4.43% jump, top oil executives tell the Texas Railroad Commission (p. 94) . . . Texaco's new additive—tertiary butyl acetate—will kick up octane rating of leaded gasoline (p. 96) . . . House subcommittee endorses asphalt runways, criticizes Air Force policy (p. 108) . . . Refining capacity levels off this year at just above 10 million barrels daily (p. 112).

PLUS A SPECIAL REFINING SECTION: Annual survey of capacities in U. S. refineries (p. 117) . . . Canadian operating refineries (p. 142) . . . New refinery construction (p. 152).



Libya Has Another Find

. . . and it looks like the best yet. Shell's wildcat may be good for 1,000 bbl. daily on basis of initial tests.

THE MOST promising discovery in Libya so far has been brought in by a subsidiary of Royal Dutch-Shell.

Libya Shell spokesmen say a find near Bir Tlacsin may be good for 1,000 bbl. daily. The wildcat, A-1, is in 1,950-sq. mile Block 70 and is 120 miles southwest of Tripoli.

The preliminary estimate of the well's potential was made after a 30-min. test at 8,909 ft. yielded 30 bbl. of crude and 1½ bbl. of salt water.

Bir Tlacsin is the fifth Libyan discovery and the second to offer hope of a commercial find. The other area with commercial possibilities is Block 32, where Oasis Oil Co. made two discoveries 22 miles apart. The Shell find, lying comparatively close to Tripoli, and the Block 32 wells, 75 miles south of the Gulf of Sirte, have the advantage of being close to tidewater.

Other activity . . . Oasis Oil, a subsidiary of Ohio Oil Co., is operator in Libya for the Conorada group.

Its first well, Bahi 1, yielded 75 bbl. on a 2½-hour test. Dahra B-1 yielded 38 bbl. on a 75-min. test. But a well drilled between them, Yhalith 1, was a dry hole.

Oasis Oil has three rigs running in the vicinity of its two discoveries. Dahra B-1 in Block 32 is testing. D-1 is drilling ahead at 3,406 ft. F-1, located 6 miles southeast of the Dahra discovery well, had very favorable oil indications at 3,200 ft. Oil men in Libya say the oil-bearing formation at Dahra extends at least to F-1.

A French company, CPT (Libya), made a noncommercial find in its B-1, Block 49, near the Algerian border. The company is now drilling at Ulet Sheppi in Tripolitania, where drilling is going ahead at 4,350 ft. after tests of oil and gas show ran to water.

Esso Standard (Libya) was the first company to strike oil, bringing in Atshan 2 on Block 1 at 500 bbl. daily. The structure, however, wasn't large enough to warrant development.

Sicily Spuds Offshore Test

SICILY'S FIRST offshore well has been started by the Italian government exploration company off the coast from Gela field.

Agip Mineraria, a subsidiary of ENI, is drilling the test from the mobile barge, Scarabeo. The rig is rated at 6,000 ft. The company is drilling ahead in Gela Nos. 23, 24, and 25 on shore.

ENI reportedly has decided to use the heavy, 8.8°-gravity crude exclusively for petrochemical production, although a topping plant is in operation at the field. Asphalt is sold locally, while light ends are recycled to help ease the problem of pumping the crude from 10,800 ft.

Argentina Ready

to make more development deals with foreign firms.

MORE oil companies may tie down exploration and development contracts in Argentina.

The state oil agency, YPF, is throwing open virtually all central and northern Argentina to development deals with foreign firms. The area being made available is many times larger than the combined tracts on which contracts were made last year.

YPF is dividing the newly opened acreage into blocks of up to 11,000 sq. miles. In case of a discovery, the immediate vicinity will be subdivided on a checkerboard arrangement into squares of about 10 sq. miles. The units will be assigned alternately to the operating company and to YPF.

Companies seeking a contract will have to agree to spend a minimum sum over a 5-year period on geological and geophysical work and on wildcatting. All risks will be taken by the contracting company, and oil and gas production must be delivered to YPF. Contracts run for 20 years, after which all permanent installations must be turned over to the government.

Firms willing to go along with the basic YPF terms can bid on the price at which they are willing to turn production over to the oil agency.

Background . . . The new YPF program apparently means that Pres. Arturo Frondizi has firmly established his policy of developing crude production through contracts with foreign companies.

The initial contracts were made over areas with proven production. L. R. Development Co. and Pan American International are already bringing in producing wells in their programs in Mendoza and Comodoro Rivadavia provinces, respectively (OGJ, Mar. 9, p. 103).

INVOLVED in top-level changes in Venezuela's oil office are Dr. Gustavo Thery Fombona, above left, and his successor, Dr. Eduardo Acosta Hermoso.

Venezuela Picks Acosta

. . . for director of hydrocarbons. He'll leave consulting job in Caracas to succeed Thery in important post.

ROMULO BETANCOURT has completed a shakeup of the bosses who run the important ministry dealing with oil industry in Venezuela.

His first move was to name Dr. Juan Pablo Perez Alfonzo as minister of mines and hydrocarbons replacing Dr. Carlos Perez de la Cova. That occurred last month.

Last week came the appointment of Dr. Eduardo Acosta Hermoso as director of the technical office of hydrocarbons under Perez Alfonzo. In recent months he has been a consultant to the ministry in Caracas and for a time was counselor for petroleum affairs in Venezuela's Washington embassy.

Acosta in his new job in Caracas will succeed Dr. Gustavo Thery Fombona, who will open a private Caracas office as a petroleum consultant.

Texas trained . . . Dr. Acosta has been in the oil business for a long time.

In his new post he will have charge of administering the petroleum affairs of the Venezuelan Government, including concessions, conservation laws, and regulations for all phases of the industry.

He was graduated as a civil engineer from Central University, Caracas and received a B.S. degree in petroleum engineering from the University of Texas in 1943.

Dr. Acosta worked 4 years for a private oil firm upon his return to Venezuela before he went into government service. He since has seen duty in nearly every branch of the industry and has represented Venezuela on many missions to this country.

In addition, he later served as consultant for a number of oil firms and the Central Bank of Venezuela, became president of a civil engineering firm, and served on the board of directors of several companies.

Change for Thery . . . The shift marks another chapter in a long and colorful oil career for Thery.

He is a native of Caracas and was graduated in 1930 from Central University with a degree in physics and mathematics. In 1935 he was appointed to the faculty of the university as a professor of law applied to engineering.

Dr. Thery also acted as cartographer, engineer, and assistant to the old director of the petroleum division of the Venezuelan Government. In 1943 he was appointed to the office of director of hydrocarbons.

New Firm Set Up

by Sinclair, BP to handle exploration, production.

A SECOND company has been formed by Sinclair Oil Co. and British Petroleum Co. to implement their long-range joint operations agreement.

The two companies have organized Sinclair & BP Explorations, Inc., to engage in crude-oil exploration and production ventures. The firm will operate primarily in Latin America.

The exploration company is the second formed under an agreement made last year by the parent firms. The first, Sinclair & BP Sales, Inc., will engage primarily in the sale of Middle East and Venezuelan crude in the Western Hemisphere.

William O. Clift, former general manager of Sinclair Somal Corp., is president and chief executive officer of Sinclair & BP Explorations. A. F. MacLeod, former manager of the lands division of BP Exploration Co., is senior vice president.

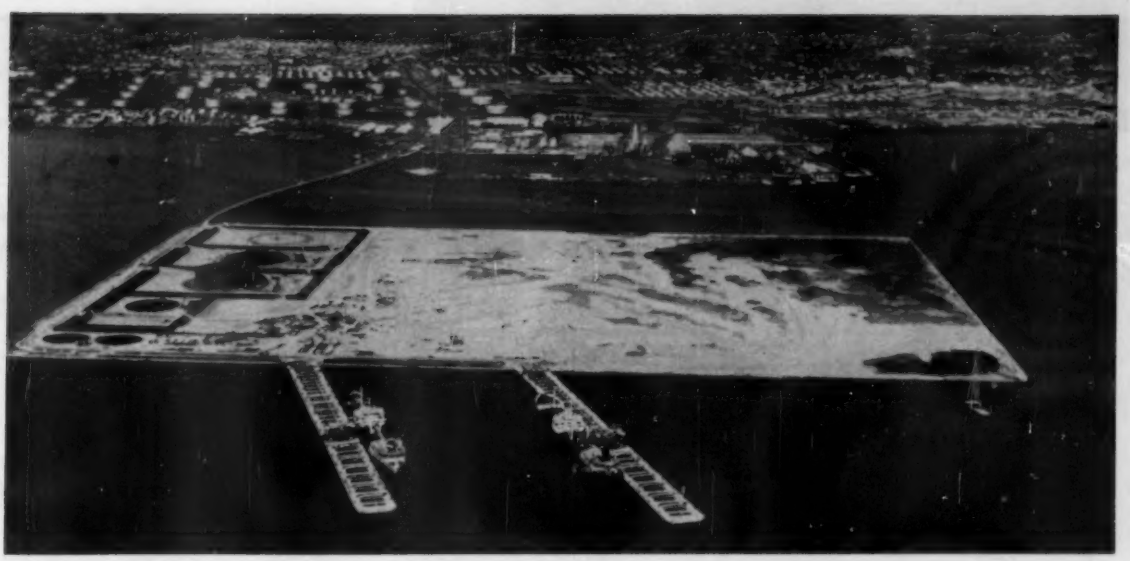
Other executives include H. R. Warman from BP, vice president and chief geologist, and F.C.R. Martin, a BP geologist, who will set up an office in South America. Raymond Halsey, geophysicist with Sinclair Oil & Gas Co., will be chief geophysicist.

WORLD

A new petrochemical complex has been opened at Berre, near Marseille, France, by Ste. Anon. des Produits Chimiques Saint-Gobain, in which Royal Dutch-Shell has 60% interest. The nearby refinery of Cie. de Raffinage Shell-Berre will supply feedstocks for "Epikote" resins, carbon black, base materials for detergents, and an expanded range of organic solvents.

Japanese tanker owners are asking their government to press for volunteer action by local refiners to change to Japanese tankers. The request was prompted by the mandatory import controls in the U.S., which shippers believe will keep the tanker market depressed. A large share of charter contracts held with non-Japanese companies are expiring this summer.

Venezuela has started to overhaul Petroquimica with the appointment of Dr. Edgard Pardo Stolk as president. A shakeup of personnel has already been planned for the government petrochemical company, one of the chief scandals of the former govern-



Lake Maracaibo Oil Terminal Is to Be Finished Soon

CREOLE Petroleum Corp.'s $24,750,000 Lacustrine oil terminal in Lake Maracaibo in Venezuela is nearing completion.

Creole, a U.S. company and Venezuela's largest oil producer, estimated the facilities are 85% completed. Yet to be finished are the last of three 268,000-bbl. crude-oil tanks with floating roofs, the terminal building for the office force and control instruments, bunker tanks and pumps, and the main cargo-loading pumps with positive-displacement meters.

The terminal is located almost a mile from shore just west of Creole's warehousing, repair, and supply area at La Salina. The terminal, covering about 125 acres, is connected to shore by a roadway and a trestle.

Two 1,100-ft. finger piers provide four tanker berths. Creole loaded 1,088,000 bbl. of crude oil on six tankers during a 24-hour period.

BRIEFS . . .

ment. Dr. Juan P. Perez Alfonzo, Minister of Mines and Hydrocarbons, says a preliminary study shows Petroquimica may not be as bad off as supposed.

Plastic parts are being tested in Russian turbodrills. Communist engineers report laboratory and field tests with 5-in. and 6⅝-in. drills show that mass-produced separable plastic stators and rotors have satisfactory service life. The parts are said to replace unit-cast steel parts at less than half the cost.

Hungary is now taking natural gas through a 277-mile, 12-in. pipeline from Romania. The system will deliver 20 million cubic feet daily of methane to a new petrochemical complex under construction on the Tisza River. Gas supplies are initially being used as boiler fuel in a power plant until facilities at the new town of Tiszapalkonya are completed.

Poland may buy equipment made in Italy for a petrochemical plant. A delegation from the Iron Curtain country is in Italy discussing the purchase with Pignone, a manufacturing subsidiary of the government oil agency, ENI. The plant reportedly would use newly discovered natural gas supplies.

Another shipment of drilling equipment from Russia and Romania is being delivered to India. The equipment will be used to expand an exploration program being carried on in western India by the government's oil and natural-gas commission.

A 5-year exploration permit covering 2,240 sq. miles in the Hassi Leila area of Algeria has been awarded to Ausonia Miniere Francaise. The block lies about 150 miles southwest of Hassi Messaoud field. The French government-controlled company must spend at least $3.2 million under the terms of the permit.

The series of world-wide crude price reductions has made a full circle with a drop of 18 cents per bbl. on a Far East posting. Sarawak/Shell Oilfields cut the price on 37°-gravity Seria crude to $2.57 per bbl. The British Borneo field produces more than 100,000 bbl. daily.

Three Brazilian oil companies have received permission from their government to explore a Bolivian concession granted to Brazil years ago. The firms are Petrobras, the government oil corporation, Petrolanza, and Petroleo Andino. Brazil has stipulated that work must be carried on without foreign backing.

Another Nigerian discovery has been made by Shell-BP exploration. The find was made at Korokoro, 25 miles south of Aba town in the eastern region. More drilling will be needed to appraise the discovery. But for the time being the rig is being moved to Bonny Island, 40 miles south of Port Harcourt.

Yugoslavia's new discovery near Sisak in Croatia is the best ever made in that country, reports from Belgrade indicate. Another discovery has been reported at Rovinj on the coast of Istria, about 140 miles west of Sisak. Seismic gear from East Germany will help evaluate the structures. The government envisions a 50,000-bbl. refinery at Ljubljana in connection with the finds. The discoveries are in northwestern Yugoslavia.

The JOURNAL's Forecast of U.S. Refining

Capacity	Crude BPCD	Crude BPSD	Thermal Cracking (Feed, BPSD)	Cat Cracking (Feed, BPSD)	Cat Reforming (Feed, BPSD)	Hydrogen Treating (Feed, BPSD)
Jan. 1, 1958	9,130,436	9,703,925	2,208,715	4,246,165	1,533,090	1,342,725
Jan. 1, 1959	9,615,787	10,154,155	2,110,455	4,567,860	1,853,435	1,714,565
Jan. 1, 1960 (Estimated)	9,782,167	10,328,855	2,166,955	4,677,860	1,942,835	1,821,165
Construction						
1959	166,380	174,700	56,500	110,000	89,400	106,600
1960	125,000	131,500	7,000	44,400	11,000	32,100

U. S. Refining Capacity to Hit a Plateau

• Journal's annual survey of U. S. refiners shows capacity will level off at just above 10 million barrels daily. Continued expansion is planned for downstream units, but alkylation is only process slated for a big growth.

EXPANSION of the nation's crude-oil refining capacity is slowing down.

After rising nearly one-half million barrels in 1958, crude capacity shows signs of gaining less than 200,000 bbl. per day during the current year. This year's building will push capacity to about 10 million barrels daily, where it is expected to remain for the immediate future.

The 1959 rate of increase is the slowest since pre-World War depression days. It indicates a needed adjustment in the nation's basic capacity which has been too high for the past few years.

Continued expansion is planned, however, for such important downstream processes as catalytic cracking, catalytic reforming, and hydrogen treating. But building activity is slowing down in these categories, too. Alkylation stands out as the one established process expected to maintain its vigorous growth pattern.

These conclusions are based on The Oil and Gas Journal's Annual Refining Survey immediately following these pages. Results are tabulated from information supplied by 162 companies operating 293 refineries in the U. S.

This slowdown in new construction comes as no surprise. Last year's survey indicated a tapering-off in crude capacity. Even so, capacity rose higher than was expected due to bottleneck removal programs for existing units, which upgraded refinery ratings without the addition of new capacity.

The decision of U. S. refiners to adhere to a policy of bringing capacity more nearly in line with smaller yearly demand increases is evident this year. The relative slowing of new catalytic processing also reflects this leveling-out in basic capacity. The lessened activity in adding catalytic cracking and reforming capacity points to another factor. These processes are now beginning to approach saturation, and their expansion in the future will be tied more closely to additions to basic capacity.

Here's what the new survey of capacity at January 1, 1959 shows:

. . . **Crude capacity** stood at 9,615,787 bbl. per calendar day. Late last year, the nation's capacity on a stream-day basis passed the 10,000,000-bbl. mark. A gain of 5.3% last year has dwindled to a projected increase of only 1.7% this current year.

. . . **Hydrogen treating** now totals 1,714,565 bbl. per day. This sizable capacity was built in a scant 5 years.

Catalytic hydrogen treating is now almost uniformly employed to pretreat catalytic reforming feedstocks. But it shows a potential for even greater growth since it is gaining new acceptance in treating middle distillate product, cat cracking feedstocks, both fresh and recycle, and a number of end products including lubricating oils, waxes and naphtha solvents. Hydrogen treating gained 27.7% last year and is due to rise another 6.2% this year.

. . . **Catalytic reforming** reached 1,853,435 bbl. per stream day by January 1, a 20.9% gain in 1 year. However, the 1959 outlook is for a decided slowdown. New capacity due on stream this year will add only 89,400 bbl. per day, a gain of only 4.8%.

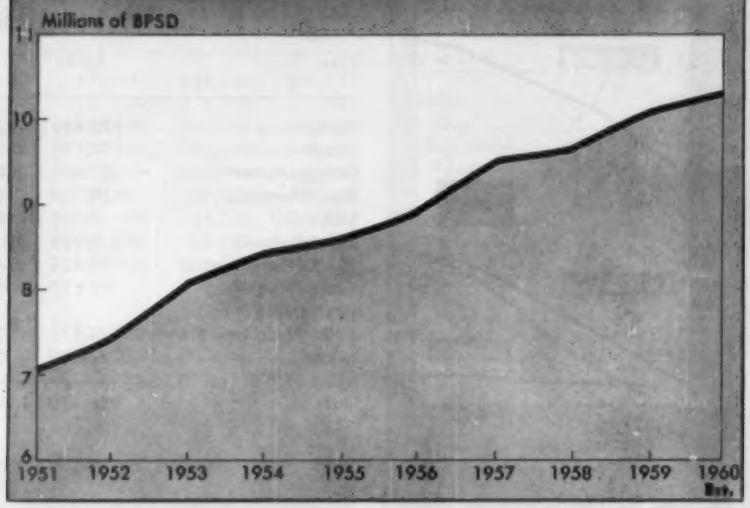
. . . **Catalytic cracking** moved upward to 4,567,860 bbl. per stream day last year. As it nears saturation levels, the upward climb is leveling out. This year a minor 2.4% gain of 110,000 bbl. is forecast.

. . . **Alkylation** is the bright spot in the growth picture, having reached the 370,120-bbl. level by the first of 1959. This 19.3% gain last year reflected the broad acceptance of alkylate in motor fuel. Previously used almost exclusively in aviation gasoline because of its high cost, alkylate is now an important component in most premium and practically all super-premium motor grades.

With its prime road octane characteristics, alkylate promises even wider

Alkylation	Polymerization	Lubes	Coke (Ton Per Day)
(Product, BPSD)			
310,365	148,873	196,013	14,658
370,120	144,240	190,465	14,900
393,570	144,240	192,915	15,400
23,450	0	2,450	500
3,000	0	0	0

Crude Capacity Is Leveling Off



This Year

use. The further addition of 6.3% in new capacity this year should be matched with similar growth in the next few years to come.

. . . **Thermal operations** declined further last year, as expected. Most thermal processes have become obsolete and many refiners have scrapped all of their thermal capacity.

Visbreaking and coking have continued in some favor, however, and a few operators have shown growing interest in converting their residual yields by these means. This trend is expected to continue in inland areas where distillate fuels command better prices. But at tidewater locations, particularly along the East and Gulf Coasts, the incentive for reducing residual yields may be lessened slightly.

The new mandatory imports program will control the influx of heavy fuel oil from abroad. No marked price reactions are expected since natural gas and coal impose competitive price ceilings. But the stronger market for domestically produced residuals may swing some decisions away from building coking and visbreaking capacity in the future.

Independents grow . . . The past year was a lean one for all refiners, both large and small. But from the standpoint of plant capacity, the smaller companies fared better than the big ones.

The 20 largest refiners which control 100,000 or more bbls. per day of

How the Majors and Independents Stand

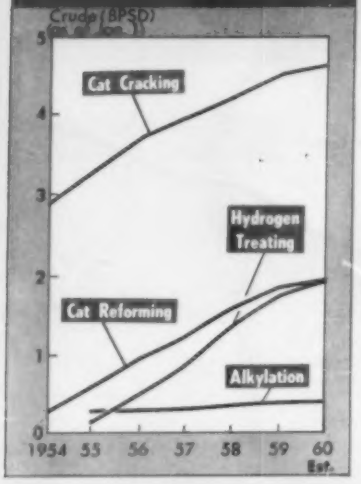
	Companies controlling over 100,000 bbl. daily capacity			Companies controlling less than 100,000 bbl. daily capacity		
	1-1-58	1-1-59	1-1-60*	1-1-58	1-1-59	1-1-60*
	(Capacities in 1,000 bbl. daily)†					
No. Companies	20	20	20	156	155	158
No. Refineries	120	118	118	191	187	190
Capacity, BPCD	7,339.5	7,729.3	7,831.0	1,790.9	1,886.5	1,951.2
Capacity, BPSD	7,803.3	8,117.9	8,231.1	1,900.6	2,036.3	2,097.8
Annual change, %	+0.8	+0.4	+1.4	+3.9	+0.7	+0.3
% of U. S. Total	80.4	80.0	79.7	19.6	20.0	20.3
Cat. Cracking	3,553.4	3,816.8	3,903.7	692.6	751.1	774.2
% on Crude	46.2	47.0	47.4	36.5	37.0	36.9
Cat. Reforming	1,232.2	1,524.4	1,580.0	300.9	329.0	362.8
% on Crude	16.0	18.8	19.2	15.8	16.2	17.3
Hydro. Treating	1,161.8	1,502.3	1,593.1	181.0	212.3	228.1
% on Crude	15.1	18.5	19.4	9.5	10.4	10.9
Alkylation	277.4	323.8	342.8	32.9	46.3	50.8
% on Crude	3.6	4.0	4.2	1.7	2.3	2.4

*Estimate based on new construction slated for 1959 completion only. †Includes plants not charging whole crude—see page 163.

Top 20 Refiners

Rank	No. Refineries	Capacity (BPCD)
1. Standard (N. J.)	8	953,040
2. Texaco	14	735,000
3. Mobil Oil	12	699,000
4. Standard (Ind.)	12	693,800
5. Standard (Calif.)	11	609,000
6. Shell	6	584,000
7. Gulf	5	555,887
8. Sinclair	6	464,000
9. Cities Service	4	292,300
10. Phillips	6	266,500
11. Tidewater	2	265,000
12. Sun	2	255,000
13. Atlantic	2	210,000
14. Standard (Ohio)	4	193,500
15. Union	6	188,800
16. Pure	4	183,800
17. Richfield	1	165,000
18. Continental	6	154,200
19. Ashland	4	143,500
20. D-X Sunray	2	118,000

Trends in Downstream Processing



Cat Reforming . . . may hit 20% of crude capacity.

(Feed Capacity, BPSD)

Type	1-1-56	1-1-57	1-1-58	1-1-59	1-1-60 (Est.)
Platforming	525,480	639,567	714,640	907,835	978,435
Ultraforming	103,150	158,370	201,590	247,390	247,390
Sinclair-Baker	37,000	84,000	93,700	145,400	145,700
Houdriforming	58,220	107,500	120,210	139,560	139,560
Mobil Oil	9,000	87,300	119,600	123,400	131,400
Powerforming	5,500	5,500	32,500	67,500	67,500
Fluid Hydroforming	61,450	62,000	62,000	62,600	62,600
Catforming	39,610	27,950	59,150	55,600	56,100
Rexforming		9,500	30,500	26,200	26,200
F. B. Hydroforming	42,870	32,870	33,000	19,000	19,000
Misc.	44,200	33,100	66,200	54,400	64,400
Total	**926,470**	**1,247,657**	**1,533,090**	**1,848,885**	**1,938,285**

Coking . . . . . due to slow down.

(Feed capacity, 1,000 BPSD)

	Delayed	Batch	Fluid	Total
1-1-55	243.8	35.3	3.8	282.9
1-1-56	296.5	27.3	13.8	337.6
1-1-57	304.7	43.9	105.8	454.4
1-1-58	319.4	37.4	100.6	457.4
1-1-59	324.1	29.6	105.8	459.5
1-1-60 (Est.)	358.1	29.6	105.8	493.5

Isomerization . . . slow getting under way.

Type	No. units 1-1-59	Product capacity, BPSD 1-1-59	Construction 1959	Product capacity, BPSD 1-1-60 (Est.)
Butane	10	23,500	4,000	27,500
Pentane and Heavier	1	3,500	4,900	8,400

crude capacity are currently expanding at an average of less than 1% per year. By contrast the smaller companies average better than 1½% growth for 1958, 1959, and 1960. As a result, the independents' share of total U.S. capacity is edging up gradually at the majors' expense.

Abandonment of some fairly large refineries in recent years has contributed to this trend. The majors lost two plants last year with the closing of American Oil Co.'s Destrehan refinery and Ashland Oil & Refining Co.'s plant at Findlay, Ohio. On the independents' part, several plant closings offset a few new refineries added last year.

The smaller refiners are improving their position on product quality as well. They still lag the majors in downstream processing on a national average. But when the numerous asphalt plants, skimming units and specialty plants are removed from the category, the remaining catalytic fuels plants stand up to an equal stature with the majors. For the most part, they are equally equipped to produce high octane gasoline and other quality products.

The independents are adopting hydrogen treating and alkylation in increasing numbers. During the next few years they will add much new capacity in these categories to close the gap with their larger competitors.

Why the slowdown? . . . The answer to this question is evident from the slackened demand for products during 1957 and 1958. But there is more to this picture than a change in the rising rate of consumption here in the U. S.

For the past several years the industry has been building a cushion of excess capacity. By means of rapid write-offs, the Government actively encouraged this excess buildup to provide for any national emergency that might arise. The strong tendency on the part of many refiners was to use this excess capacity, with a resulting inflation in stocks and a softening market.

During 1957 refiners operated their plants at an average of 87% of calendar-day capacity. But last year marked a turning point. Runs were actually lower than in 1957 by 313,000 bbls. per day.

This cut product stocks by 35,000,000 bbls. The reduction in stocks would have been greater had it not been for an increase of 69,000,000 bbl. in product imports over 1957, amounting to 190,000 bbl. per day.

This voluntary reduction in runs found refiners operating at an average of 81.15% of calendar day capacity last year, as compared with 87% the year before. This drop was accentuated by a 485,000-bbl. jump in capacity, mostly in existing units. Small wonder that refiners are not interested today in adding substantially to their basic crude capacity.

Does the retarded construction rate mean that our cushion is dwindling? Not yet. In terms of averages, the unused cushion last year amounted to 1,767,000 bbl. per day as compared with 1,156,000 bbls. per day in 1957.

The drying up of some product imports, plus a policy of holding the line on stocks, may combine with a better demand picture this year to shrink this

Hydrogen Treating . . . more use promised in product improvement

By process type (BPSD)	1-1-56	1-1-57	1-1-58	1-1-59	1-1-60 (Est.)
Unifining	205,000	364,405	498,605	641,505	697,910
Hydrofining (Ind.)	34,600	124,700	187,600	216,100	216,100
Hydrofining (Esso)	113,800	133,300	164,900	165,700	176,700
Gulfining	.....	50,000	100,000	100,000	100,000
Mobil Oil	.....	67,300	99,260	149,900	149,900
Sinclair	10,000	27,000	87,500	99,000	99,000
Shell	31,000	49,600	70,700	104,900	104,900
Kellogg	3,000	3,000	20,000	20,000	20,000
Houdry	13,500	13,500	13,960	22,110	22,110
Hydrobon	.....	.....	.....	55,000	170,000
Ashland	.....	.....	.....	30,000	30,000
Misc.	22,100	46,150	100,200	109,200	144,700
Total	**433,000**	**878,955**	**1,342,725**	**1,713,415**	**1,931,320**

HYDROGEN TREATING—NO. 2

Type of feed	BPSD
Naphtha	1,213,565
Mid. Dist.	373,150
Cracked Naph.	33,900
Cat. Feed	19,800
Cat. Recycle	7,100
Solvent Naph.	10,100
Lubes	13,300
Other	42,500

Cat Cracking . . . approaching saturation?

(Feed capacity, BPSD)

Type	1-1-56	1-1-57	1-1-58	% recy.	1-1-59	% recy.	1-1-60 (Est.)
Fluid	2,694,312	2,975,785	3,150,165	26.1	3,482,570	22.9	3,591,170
T.C.C.	733,520	727,070	764,600	30.0	741,900	31.6	741,900
Houdriflow	203,800	215,980	249,800	25.1	255,400	17.3	256,800
Houdry F. B.	55,300	48,300	68,800	20.1	76,300	7.6	76,300
Cycloversion	22,400	21,430	12,350	...	11,690	...	11,690
Total	**3,709,332**	**3,988,565**	**4,246,165**	**26.8**	**4,567,860**	**23.3**	**4,677,860**

Alkylation . . . alone in moving up.

(Product capacity, BPSD)

	Sulf.	HF	Total
1-1-55	186,614	49,614	236,228
1-1-56	197,869	65,540	263,409
1-1-57	212,659	59,960	272,619
1-1-58	244,615	65,750	310,365
% crude	2.5	0.7	3.2
1-1-59	290,400	79,720	370,120
% crude	2.85	0.79	3.64
1-1-60 (Est.)	312,350	81,220	393,570

excess. In the Defense Department, officials have expressed private concern at this prospect. Some pressure may be brought to bear for new construction. But refiners tend to take a "wait and see" attitude. The data from next year's survey may be significant. Meanwhile, capacity is going to remain fairly stable.

Octane capacity high . . . The refining picture today is a strong one regarding product quality.

Refiners have been adding to cat reforming, hydrogen treating, and alkylation capacity at a rate higher than basic crude capacity, thus building up their potential for hydrocarbon octanes.

Last year, research-octane ratings remained almost static until the last quarter. On the average, both premium and regular grades rose only 0.4 number for the entire calendar year. The addition of further processing capacity for quality was put to use—as a result refiners backed tetraethyl lead out of their gasoline to a marked extent. TEL content of premium grade declined from 2.51 to 2.45 cc. per gallon and in housebrand the drop was even sharper, from 1.91 to 1.56 cc. per gallon.

The coming motoring season will find refiners in a prime position to raise octanes if competitive factors require it. But they will be inclined to do so by raising lead levels rather than by raising severities in their existing process units or by building new ones.

The more extended future on octanes is not apparent yet, but Detroit may well resume the pressure with the 1960 models. Since refiners must begin building process units up to 2 years in advance of their requirements, we may see some upward turn in new contracts later this year.

More emphasis will be placed on processes which will boost the low-sensitivity paraffin components. Look for alkylation, isomerization, and the new molecular sieves to command more attention from now on.

Isomerization . . . A sleeper among the processes has been butane isomerization. Much attention was drawn to the newer pentane and hexane processes, but the past year has seen no new contracts let for such units. Two units with combined capacity of 11,900 bbl. per day are now operating and a third is coming on stream shortly.

Butane isomerization units on stream at the first of the year number 13, with capacity totalling 51,000 bbl. per day. These are tied directly into alkylation which has slowed down the move into isomerization of the heavier hydrocarbons.

Hydrogen treating . . . This year for the first time the Journal asked refiners where they were using their hydrogen-treating capacity. As expected, naphtha pretreating prior to cat reforming dominated with 70.8% of total capacity.

Middle distillates are being processed in increasing volumes and account for 21.7% of total capacity now installed. Further in the future is the treating of fresh cat feed, cat recycle, solvent naphthas, lubes, and waxes. None of these categories yet exceeds 2% of total capacity, however.

The JOURNAL's Forecast of Canadian Refining

	Crude		Feed, BPSD					Product, BPSD	
	BPCD	BPSD	Vacuum	Thermal Cracking	Catalytic Cracking	Cat Reforming	Hydrogen Treating	Alkylation	Polymerization
Capacity									
Jan. 1, 1958	758,230	823,240	296,920	119,345	360,940	126,625	58,775	2,230	30,807
Jan. 1, 1959	818,230	886,160	315,520	145,555	388,960	147,045	130,970	4,920	16,045
Jan. 1, 1960 (Estimated)	849,580	919,160	335,520	145,555	402,600	153,145	142,000	5,660	16,045
Construction									
1959	31,350	33,000	19,500	0	13,700	6,100	12,000	740	0
1960	60,000	63,000	15,000	0	22,000	13,150	19,500	1,500	800

Canada Refining Capacity Climbs Fast

• New plants in 1960 will increase nation's capacity to a million barrels daily. Overcapacity is big worry.

MODEST 1959 gains in Canadian refining capacity will be overshadowed next year when two plants totaling about 63,000 bbl. per stream day go into operation.

These two plants will push the nation's daily refining capacity over the million-barrel mark and will likely contribute to an existing overcapacity situation in the East.

The big expansion in Canada is similar to that in the U.S., which now finds itself overbuilt after a vigorous postwar construction program.

A moderate gain of about 31,000 bbl. in Canadian capacity is expected this year. The big spurt will come in 1960. BP Canada, Ltd., will put its $30-million, 25,000-bbl. plant on stream at Ville d'Anjou, Que. And Irving Refining, Ltd., will complete its 38,000-bbl. plant at St. John, N.B. The Irving plant will cost between $45 million and $50 million.

A third new Canadian refinery is also proposed. Shell Oil Co. of Canada, Ltd., plans to build a 20,000-bbl. plant at Bronte, Ont., but the timetable on this project is not certain.

Quality increase . . . Canadian refiners in recent years have placed as much emphasis on product quality as on meeting a soaring demand.

It was quite common for Canada to lag considerably behind the U.S. in downstream processing capacity which contributes to the quality of the products, principally motor fuel. There's still a lag, but it's becoming less significant. For instance, cat-cracking capacity in the U.S. is equal to about 45.5% of crude capacity. In Canada, the relationship is about 43%.

Cat-reforming capacity in the U.S. is equal to about 18% of crude capacity, and in Canada it's 16.5%. The comparison in hydrogen treating is 17.1% in the U.S. and 14.7% in Canada.

The fastest-moving process has been hydrogen treating, which jumped from about 59,000 bbl. in 1958 to about 131,000 bbl. at the beginning of this year. It's due to reach 142,000 bbl. by 1960, and another 20,000 bbl. of new capacity is on the books.

Growth in cat-reforming capacity is slowing down this year. It will gain only 6,100 bbl. this year and another 13,000 bbl. the following year.

Alkylation has been the laggard. This process has been undergoing a stimulating growth in the U.S., but the growth is rather slow in Canada.

Alkylation capacity jumped 2,690 bbl. last year to boost total to 4,920 bbl. This included 1,050 bbl. capacity at British American Oil Co.'s new 20,000-bbl. refinery at Port Moody, B. C.

New construction in Canada this year will hike alkylation capacity by only 740 bbl. But this will be doubled in 1960 when Imperial Oil completes a 1,500-bbl. unit at its Edmonton, Alta., refinery.

Overcapacity . . . The real concern among Canadian refiners is overcapacity, which promises to get worse before it gets better.

But the potential of Canada is truly a great one, and refiners hope a vigorous upswing in demand will make the difference in the years ahead. The long-term outlook is generally promising. But for the immediate future a long supply situation will set the tempo in the market.

About the Journal's Survey

FIGURES in this report are based on plant-by-plant capacity data given to us by operating refiners. The detailed survey, which is the only one of its kind follows.

This survey includes all facilities which were in operation at the first of this year and is restricted to plants charging whole crude oil. An appendix lists 13 specialty plants processing petroleum or related fractions to produce asphalt, lubes, wax, and fuels. These units are included in the report on these pages, explaining why some totals will not agree exactly with those in the summary table.

It is recognized that a survey of refineries does not include all sources of gasoline. Numerous field processing plants produce blends or finished motor fuel, but are not included because they are not classed as refineries. They will be surveyed in our April 27 issue.

Except where designated, all figures in the Journal survey are expressed in barrels per stream day. In a few cases only calendar-day capacity is reported to us. Such figures are identified and published as reported in the basic survey. To arrive at consistent totals, calendar-day figures are converted to stream-day basis. They are divided by 0.95 in the case of crude and vacuum units and 0.90 in other processes.

The Journal does not attempt to pinpoint forecasts of capacity. But it does include a listing of all new construction planned at the first of the year. These net additions to capacity have proved reasonably accurate in projecting over a 1-year period. But they do not take into account the unscheduled shutdown, retirement, or downgrading of capacity which may occur during 1959.

Note: In the U. S. summary table opposite, and the Canadian summary, page 142, the crude capacity headings in BPCD and BPSD are reversed.

Journal Survey of Refineries in the United States

Location and Capacities as of January 1, 1959

State	No. Plants	Crude Capacity BPSD	Crude Capacity BPCD	Charge — Barrels Per Stream Day: Vacuum Distillate	Thermal Operations	Catalytic Cracking: Fresh Feed	Catalytic Cracking: Recycle	Catalytic Reforming	Hydro-treating	Production — Barrels Per Stream Day: Alkylation	Polymeri-zation	Lubes	Coke (Tons)	Asphalt
Alabama	4	15,550	17,700	9,850	.....	.....	.....	.....	.....	.....	.....	.....	.....	9,650
Arkansas	6	86,340	90,300	47,500	13,000	33,000	9,600	16,640	17,500	2,700	850	4,050	400	6,250
California	34	1,306,900	1,374,580	562,460	516,510	335,120	101,550	234,750	207,915	43,780	3,800	22,560	3,540	66,650
Colorado	7	35,900	39,600	5,200	12,400	11,600	5,300	7,650	.....	.....	1,250	.....	.....	1,200
Delaware	2	133,500	143,700	92,500	42,000	58,000	44,000	45,000	88,000	5,000	5,100	.....	1,200	1,700
Florida	1	2,000	2,150	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	1,180
Georgia	1	6,500	7,000	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	3,800
Illinois	13	573,800	600,600	158,750	154,700	238,900	46,970	132,300	131,600	30,700	10,375	3,250	1,880	28,900
Indiana	11	479,225	499,025	100,800	150,750	154,660	22,540	129,675	96,400	10,160	4,200	10,250	1,370	20,350
Kansas	14	327,975	346,500	80,150	51,850	123,300	63,300	61,900	15,700	12,200	7,050	3,600	485	21,050
Kentucky	4	100,500	107,300	31,000	10,500	31,600	10,635	8,900	12,000	.....	4,450	.....	.....	12,000
Louisiana	12	770,160	802,200	216,815	109,300	322,800	151,900	119,410	20,400	52,200	11,855	12,180	325	10,755
Maryland	3	30,000	35,800	18,500	6,000	.....	.....	.....	.....	.....	.....	.....	.....	20,100
Massachusetts	1	50,000	55,000	13,100	.....	18,000	14,000	7,200	7,200	.....	1,800	.....	.....	10,000
Michigan	15	172,200	183,600	47,000	26,800	53,400	20,300	29,450	28,950	4,800	2,350	.....	350	13,000
Minnesota	4	65,900	69,700	10,000	12,000	25,750	15,250	7,800	18,800	.....	1,850	.....	580	5,000
Mississippi	2	15,800	17,100	3,100	4,800	9,300	16,300	2,500	1,200	2,500	.....	.....	225	2,250
Missouri	1	76,100	80,000	7,200	44,500	32,000	2,000	14,000	20,000	3,800	1,800	.....	400	3,000
Montana	9	82,150	88,100	29,300	18,750	26,400	21,900	11,250	28,610	.....	3,335	.....	200	13,350
Nebraska	1	2,800	3,000	.....	1,100	.....	.....	650	.....	.....	.....	.....	.....	.....
New Jersey	7	517,800	546,400	232,600	57,300	177,500	44,200	71,600	139,300	18,200	9,900	8,000	.....	22,600
New Mexico	6	28,580	30,300	4,980	1,875	7,560	1,900	4,930	2,380	1,650	400	.....	.....	2,100
New York	4	102,500	107,800	21,300	.....	37,400	18,200	16,400	18,900	3,000	2,200	.....	.....	5,300
North Dakota	2	41,000	42,500	.....	1,000	14,000	10,000	6,700	.....	1,630	1,400	.....	.....	.....
Ohio	11	447,787	479,800	108,200	106,370	208,500	57,800	86,700	59,500	10,900	9,870	3,600	1,000	18,700
Oklahoma	14	391,780	407,600	111,000	93,300	158,380	61,400	72,380	55,800	15,800	9,680	11,300	1,285	8,775
Oregon	1	3,500	6,500	6,500	.....	.....	.....	.....	.....	.....	.....	.....	.....	4,200
Pennsylvania	13	670,450	706,800	210,020	113,300	245,620	63,660	163,400	138,400	20,600	8,280	28,675	.....	10,700
Rhode Island	2	12,000	12,600	1,900	.....	.....	.....	.....	.....	.....	.....	.....	.....	8,700
South Carolina	1	11,440	13,000	10,500	.....	.....	.....	.....	.....	.....	.....	.....	.....	5,950
Tennessee	2	16,300	17,300	5,600	.....	6,000	2,000	.....	.....	1,000	400	.....	.....	2,500
Texas	57	2,546,330	2,695,100	811,390	480,500	956,740	197,475	507,240	527,300	115,400	27,435	69,590	540	37,700
Utah	6	100,200	103,700	30,700	8,500	37,900	11,500	12,500	1,000	5,000	1,100	120	.....	2,850
Virginia	1	33,000	35,000	19,000	12,500	22,000	8,000	7,600	22,600	.....	2,500	.....	600	.....
Washington	6	150,000	161,700	53,500	8,600	65,600	19,700	34,900	33,200	5,100	6,600	.....	.....	5,700
West Virginia	2	6,570	7,300	2,000	2,350	.....	.....	3,000	3,000	.....	155	1,600	.....	.....
Wisconsin	2	19,000	20,500	9,000	1,500	.....	.....	3,500	2,000	.....	.....	.....	.....	4,700
Wyoming	9	108,100	117,300	43,800	21,400	40,820	7,930	15,700	21,500	2,600	2,225	840	220	12,200
Puerto Rico	2	76,150	80,000	51,800	20,000	35,300	31,400	7,460	.....	1,400	2,830	.....	.....	.....
Total	293	9,615,787	10,154,155	3,167,015	2,103,455	3,487,150	1,080,710	1,848,885	1,713,415	370,120	145,040	179,615	14,600	442,860

Where the plants are, their capacities, and types of processing

LEGEND

Processes in table are identified by numbers:

THERMAL PROCESSES
1. Gas-oil cracking
2. Visbreaking
3. Naphtha reforming
4. Fluid coking
5. Delayed coking
6. Batch coking
7. Polyforming
8. Cracking, general
9. Residuum cracking
10. Clarified cracking

CATALYTIC CRACKING
1. Fluid
2. Thermofor
3. Houdriflow
4. Houdry
5. Cycloversion

CATALYTIC REFORMING
1. Platforming
2. Fluid hydroforming
3. Fixed-bed hydroforming
4. Houdriforming
5. Ultraforming
6. Catforming
7. Sinclair-Baker
8. Powerforming
9. Rexforming
10. Iso-Plus
11. Hyperforming
12. Cycloversion
13. Socony-Mobil
14. Thermofor
15. Own
16. Undefined

CATALYTIC HYDROGEN TREATING
1. Unifining
2. Esso Hydrofining
3. Indiana Hydrofining
4. Hydrotreating
5. Gulfining
6. Houdry
7. Shell vapor phase
8. Shell Trickle
9. Diesulforming
10. Sinclair
11. Kellogg
12. Platreating
13. Socony-Mobil
14. Own
15. Undefined
16. Hydrobon

ALKYLATION
1. Sulfuric acid
2. Hydrofluoric acid

POLYMERIZATION
1. Thermal
2. Catalytic

Company and Location	Crude Capacity BPCD	Crude Capacity BPSD	Charge — Barrels per Stream Day: Vacuum Distillate	Thermal Operations	Catalytic Cracking: Fresh Feed	Catalytic Cracking: Recycle	Catalytic Reforming	Hydrogen Treating: Unit	Hydrogen Treating: Feed	Production — Barrels per Stream Day: Alkylation	Polymerization	Lubes	Coke (Tons)	Asphalt
Alabama														
American Bitumuls & Asphalt Co.:														
Mobile	5,000	6,000	6,000	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	4,800
Hunt Oil Co.:														
Tuscaloosa	7,500	8,000	3,850	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	3,000
Vulcan Asphalt Refining Co.:														
Cordova	1,800	2,200	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	1,100
Warrior Asphalt Corp.:														
Holt	1,250	1,500	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	750
Total	15,550	17,700	9,850	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	9,650
Arkansas														
American Oil Co.:														
El Dorado	43,000	45,000	20,000	[1]3,000	[1]21,500	4,200	[5]12,240	[3]12,500	Naphtha	[2]1,500	[2]500	.....	400	.....
Berry Asphalt Co. of Ark.:				[5]10,000										
Stephens	2,200	2,400	1,400	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	600
Waterloo	1,500	1,800	1,500	.....	.....	.....	.....	.....	.....	.....	.....	650	.....	600
Cross, Henry H., Co.:														
Smackover	6,000	6,300	1,200	.....	.....	.....	.....	.....	.....	.....	.....	700	.....	700

REFINING SURVEY (ARKANSAS Continued)

Company and Location	Crude Capacity BPCD	Crude Capacity BPSD	Charge — Barrels per Stream Day: Vacuum Distillate	Thermal Operations	Catalytic Cracking Fresh Feed	Catalytic Cracking Recycle	Catalytic Reforming	Hydrogen Treating Unit	Hydrogen Treating Feed	Production — Barrels per Stream Day: Alkylation	Polymerization	Lubes	Coke (Tons)	Asphalt
Lion Oil Co., Div. Monsanto Chem. Co.:														
El Dorado	29,000	30,000	18,400		[1]5,400 [2]6,400	5,400	[1]4,400	[1]5,000	Naphtha	[1]1,200	[2]350	700		2,700
Macmillan Petroleum Co.:														
Norphlet	4,640	4,800	5,000									2,000		1,650
Total	86,340	90,300	47,500	13,000	33,300	9,600	16,640	17,500		2,700	850	4,050	400	6,250

California

Bankline Oil Co.:														
Bakersfield	11,400	12,000		[1]3,000 [4]4,000						[1]1,000			20	
Caminol Co.:														
Hanford	6,000	7,500		[1]600 [2]2,000 [3]400							[2]100			
Century Oil Co.:														
Long Beach	5,000	5,000												
Douglas Oil Co. of Calif.:														
Bakersfield	8,450	8,800		[1]4,600			[1]2,200	[1]1,300	Naphtha					
Paramount	6,650	7,000	5,200											3,500
Santa Maria	3,350	3,500	2,800											2,800
Edgington Oil Refineries, Inc.:														
Long Beach	6,000	7,000	7,000					[15]7,000	Crude			1,400		3,150
Oxnard	3,000	3,000												2,550
Envoy Petroleum Co.:														
Long Beach	3,750	3,750												2,000
General Petroleum Corp.:														
Torrance	125,000	128,000	38,000	[2]28,500 [5]26,500	[2]28,000	24,000	[13]12,000 [14]14,300			[2]3,700	[2]700		1,100	
Golden Bear Oil Co.:														
Oildale	4,000	4,100	4,100									2,000		1,500
Golden Eagle Refining Co., Inc. (formerly Sunset International Petroleum Corp.):														
Torrance	8,500	9,000		[2]4,500							[2]90			
Macmillan Petroleum Corp.:														
Long Beach	8,000	9,000										200		2,700
Mohawk Petroleum Corp.:														
Bakersfield	12,500	13,200		[2]4,500			[1]2,500	[1]925			[2]60			
Newhall Refining Co., Inc.:														
Newhall	2,800	3,000	1,000											500
Oxnard Oil & Refining Co.:														
Oxnard	1,800	1,800												1,000
Palomar Oil & Refining Corp.:														
Bakersfield	1,300	1,300										390		520
Richfield Oil Corp.:														
Wilmington (Watson plant)§	165,000	173,700	63,000	[1]23,000 [2]29,000	[1]41,000 [2]19,500	22,000 10,500	[7]17,000	[4]8,000 [10]17,000	Cat. naph. SR naph.	[1]7,000	[2]1,900			2,690

REFINING SURVEY (CALIFORNIA Continued)

Company and Location	Crude Capacity BPCD	Crude Capacity BPSD	Charge — Barrels per Stream Day: Vacuum Distillate	Thermal Operations	Catalytic Cracking: Fresh Feed	Catalytic Cracking: Recycle	Catalytic Reforming	Hydrogen Treating Unit	Hydrogen Treating Feed	Production — Barrels per Stream Day: Alkylation	Polymerization	Lubes	Coke (Tons)	Asphalt
Rothschild Oil Co.:														
Santa Fe Springs	14,000	15,400	.....	[1]5,000	.....	.....	[1]1,200	.....	.....	.....	[2]150	.....	.....	.....
Seaside Oil Co.:														
Ventura	5,500	5,500	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....
Shell Oil Co.:														
Martinez	55,000	57,800	11,600	[6]33,000	.....	.....	[1]5,800	.....	.....	.....	.....	3,300	.....	7,450
Wilmington-Dominguez§	79,000	83,000	47,000	[6]36,000	[1]25,200	1,100	[1]16,500	[7]28,600	Naphtha	[1]5,800	.....	.....	.....	200
Socal Oil & Refining Co.:														
Huntington Beach	2,400	3,000	.....	[1]1,700	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....
Standard Oil Co. of Calif.:														
Bakersfield	26,000	(‡)	.....	[6][9]9,000	.....	.....	[6]15,000	[6]15,000	Naphtha	.....	.....	.....	.....	[6]1,000
El Segundo	150,000	(‡)	[6]76,000	[6][1]11,000	[6]40,000	[6]15,000	[6][1]30,000	[6][1]20,000	Naphtha	[6]15,400	.....	.....	.....	[6]8,325
Richmond	180,000	(‡)	[6]50,000	[6][9]59,000 [6]27,500 [6][9]50,000	[6]32,000	[6]10,000	[6][1]40,000	[6][1]40,000	Naphtha	[6][2]4,000	.....	[6]10,000	.....	[6]11,100
Sunland Refining Corp.:														
Bakersfield	4,500	4,730	.....	[2]1,100	.....	.....	[1]1,000	.....	.....	.....	.....	.....	.....	.....
Texas Co., The:														
Wilmington§	60,000	(‡)	[6]35,000	[6][1]10,000	[6][1]28,000	.....	[6][1]10,000	[6][9]9,000	Crkd. naph.	[6][1]4,400	.....	.....	.....	.....
Tidewater Oil Co.:														
Avon§	135,000	142,000	74,500	[1]20,000 [4]42,000	[1]45,000	.....	[1]10,000 [4]22,500	[1]34,500	Naphtha	[1]6,000	.....	1,670	1,200	.....
Union Oil Co. of Calif.:														
Arroyo Grande (Santa Maria)	21,500	24,500	.....	[5]15,000	.....	.....	.....	.....	.....	.....	.....	.....	720	.....
Rodeo (Oleum)	45,800	48,200	34,100	[1]15,000 [5]13,000	.....	.....	[1]13,000	[1]18,500	Naphtha	.....	.....	2,500	500	1,600
Santa Maria (Orcutt)	4,700	5,000	1,500	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	3,000
Wilmington (Los Angeles)§	109,000	115,000	87,000	[1]16,000 [2]18,500	[1]34,000 [2]24,000	8,000 8,000	[1]12,400	[1]14,000	Naphtha	[1]5,000	.....	.....	.....	6,700
Wilshire Oil Co. of Calif. (Pontiac Western Corp.):														
Norwalk (Santa Fe Springs)	32,000	33,000	10,000	[1]7,000	[1]7,400	300	[1]10,000	[1]10,000	Naphtha	.....	[2]800	.....	.....	2,000
Total	1,306,900	1,374,580	562,460	516,510	335,120	101,550	234,750	207,975	.....	43,780	3,800	22,560	3,540	66,650

*Barrels per calendar day. †State totals include crude capacities not reported and calendar-day figures converted to stream-day basis. ‡Not reported. §Butane isomerization units operating at: Richfield, Watson, 1,000 b.p.s.d.; Shell, Wilmington-Dominguez, 3,400 b.p.s.d.; The Texas Co., Wilmington, 1,500 b.p.s.d.; Tidewater, Avon, 2,700 b.p.s.d.; Union, Wilmington, 1,500 b.p.s.d.

Colorado

Bay Petroleum Corp.:														
Denver	10,000	12,000	3,000	[2]6,000	[1]5,000	2,000	[7]3,500	.....	.....	.....	[2]600	.....	.....	.....
Continental Oil Co.:														
Denver	13,600	14,700	.....	[1]3,500	[2]6,600	[2]3,300	[15]3,500	.....	.....	.....	[2]650	.....	.....	.....
Empire Petroleum Co.:														
Denver	5,000	5,500	2,200	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	1,200
Oriental Refining Co.:														
Alamosa	1,000	1,000	.....	[1]600	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....
Denver	3,300	3,300	.....	[1]1,500	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....
Skelly Oil Co.:														
Denver	1,400	1,500	.....	[1]800	.....	.....	[1]650	.....	.....	.....	.....	.....	.....	.....
Uinta Oil Refining Co. (formerly Wesco):														
Rangely	1,600	1,600	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....
Total	35,900	39,600	5,200	12,400	11,600	5,300	7,650	.....	.....	.....	1,250	.....	.....	1,200

REFINING SURVEY

Company and Location	Crude Capacity BPCD	Crude Capacity BPSD	Charge — Barrels per Stream Day: Vacuum Distillate	Thermal Operations	Catalytic Cracking Fresh Feed	Catalytic Cracking Recycle	Catalytic Reforming	Hydrogen Treating Unit	Hydrogen Treating Feed	Production — Barrels per Stream Day: Alkylation	Polymerization	Lubes	Coke (Tons)	Asphalt
Delaware														
Texas Co., The:														
Claymont	3,500	(‡)	*1,750	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	*1,500
Tidewater Oil Co.:														
Delaware City	130,000	140,000	90,700	[4]42,000	[1]58,000	44,000	[4]45,000	[1]30,000 [1]48,000 [1]10,000	Naphtha Mid. dist. Other	[1]5,000	[2]5,100	.....	1,200	.....
Total†	133,500	143,700	92,500	42,000	58,000	44,000	45,000	88,000	.....	5,000	5,100	.....	1,200	1,700

*Barrels per calendar day. †State totals include crude capacities not reported and calendar-day figures converted to stream-day basis. ‡Not reported.

Florida														
Seminole Asphalt & Refining, Ltd.:														
St. Marks	2,000	2,150	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	1,180
Georgia														
American Oil Co.:														
Savannah	6,500	7,000	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	3,800
Illinois														
Advance Refining Co., Inc.:														
Centralia	3,000	3,000	.....	.....	[5]600	90	.....	.....	.....	.....	.....	.....	.....	.....
Clark Oil & Refining Corp.:														
Blue Island	35,000	35,500	14,000	[1]1,800	[1]14,000 [3]7,200	5,000	[1]7,200	.....	.....	[2]2,300	[2]600	.....	.....	.....
Cross, Henry H., Co.:														
Colmar	1,000	1,100	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....
Mobil Oil Co.:														
East St. Louis	43,000	45,200	.....	[5]12,700	[2]19,500	8,300	[1]8,500	[1]16,000	Naphtha	[2]2,600	[2]700	.....	400	.....
Ohio Oil Co.:														
Robinson	48,800	50,000	18,050	[1]9,000 [5]7,500	[1]22,000	8,000	[4]10,000	.....	.....	[1]2,000	[2]1,500	.....	300	.....
Pana Refining Co., Div. Illinois Farm Supply Co.:														
Pana	5,000	5,500	.....	[1]2,500	.....	.....	[1]1,600	[1]1,600 [1]400	S.R. naph. Cr. naph.	.....	[2]145	.....	.....	.....
Pure Oil Co.:														
Lemont	47,500	(‡)	.....	[1]3,000	[1]22,000	6,000	[7]12,000	[1]17,000	Naphtha	[2]1,600	[2]1,800	.....	.....	5,500
Shell Oil Co.:														
Wood River§	175,000	184,000	71,500	[3]16,800 [6]14,800 [8]16,300	[1]58,000	18,000	[1]42,000	[7]21,000 [7]13,000	Naphtha Range fuel	[1]11,000	[2]1,250	3,250	900	11,500
Sinclair Refining Co.:														
Hartford	29,000	31,000	12,000	[1]6,000	[1]11,000	580	[7]6,000	[1]6,000	Naphtha	.....	[2]800	.....	.....	2,000
Standard Oil Co. (Ind.):														
Wood River	51,300	53,500	6,000	[1]16,000 [3]8,000	[1]18,000	1,000	[5]9,200	[3]15,000	Naphtha	[1]3,900	[2]120	.....	.....	3,300

REFINING SURVEY (ILLINOIS Continued)

Company and Location	Crude Capacity BPCD	Crude Capacity BPSD	Charge — Barrels per Stream Day: Vacuum Distillate	Thermal Operations	Catalytic Cracking Fresh Feed	Catalytic Cracking Recycle	Catalytic Reforming	Hydrogen Treating Unit	Hydrogen Treating Feed	Production — Barrels per Stream Day: Alkylation	Polymerization	Lubes	Coke (Tons)	Asphalt
Texas Co., The.:														
Lawrenceville	67,000	(‡)	*20,000	*[1]12,000	*[1]30,000	(‡)	*[1]13,500	*[1]13,500	S.R. naph.	*[1]2,300	*[2]2,500	.....	.....	*2,700
Lockport	67,000	(‡)	*13,500	*[1]15,000	*[1]30,000	(‡)	*[1]19,000	*[1]19,000	S.R. naph.	*[1]4,400	*[2]600	.....	*250	*3,200
				*[5]9,500										
Wireback Oil Co.:														
Plymouth	1,200	1,200	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....
Total†	573,800	600,600	158,750	154,700	238,900	46,970	131,600	125,800	.....	30,700	10,375	3,250	1,880	28,900

*Barrels per calendar day. †State totals include crude capacities not reported and calendar-day figures converted to stream-day basis. ‡Not reported. §Includes butane isomerization unit 2,800 b.p.s.d.

Indiana

Allby Asphalt & Refining Co.:														
Hammond	9,000	10,000	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	4,000
Berry Refining Co.:														
Gary	13,300	14,000	3,600	.....	.....	.....	[1]2,000	[1]2,000	Naphtha	.....	.....	.....	.....	1,450
Cities Service Oil Co. (Del.):														
East Chicago	58,000	58,000	.....	[5]15,000	[1]22,500	7,500	[2]13,000	.....	.....	[1]2,560	.....	.....	440	.....
							[7]8,000							
Indiana Farm Bureau Coop. Association, Inc.:														
Mount Vernon	12,000	12,500	3,800	[2]3,000	[1]3,760	940	[1]3,000	[1]700	Mid. dist.	.....	[2]300	.....	.....	.....
								[1]1,400	Cat. recycle					
Jarvis Refining Co.:														
Troy	1,350	1,500	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....
Laketon Asphalt Refining Co.:														
Laketon	4,500	4,725	2,500	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	1,000
Mobil Oil Co.:														
East Chicago	36,000	37,800	.....	[1]7,500	[2]15,400	3,900	[1][3]9,900	[1][3]13,300	Naphtha	[1]2,600	.....	.....	.....	.....
R. J. Oil & Refining Co., Inc.:														
Princeton	4,275	4,500	.....	[1]1,750	.....	.....	[1]775	.....	.....	.....	.....	.....	.....	.....
Rock Island Refining Corp.:														
Indianapolis	14,000	16,000	4,200	[2]6,600	[1]7,000	1,200	[1]3,000	[1]5,000	Gasoline	.....	[2]450	.....	.....	.....
								[1]500	Naphtha					
Sinclair Refining Co.:														
East Chicago	111,000	120,000	47,000	[1]12,000	[1]36,000	9,000	[7]20,000	[1]03,500	Lube	.....	[2]2,450	2,750	.....	4,000
				[2]18,000										
Standard Oil Co. (Ind.):														
Whiting	215,800	220,000	42,200	[1]25,000	[1]70,000	.....	§[2]14,000	[2]70,000	Naphtha	[1]5,000	[2]1,000	7,500	930	9,900
				[2]25,000			[5]56,000							
				[5]36,900										
Total	479,225	499,025	100,800	150,750	154,660	22,540	129,675	96,400	.....	10,160	4,200	10,250	1,370	20,350

§Idle.

Kansas

American Petrofina Co. of Texas (formerly El Dorado Refining Co.):														
El Dorado	19,000	20,000	6,000	.....	[1]6,000	4,000	[1]2,500	.....	.....	.....	[2]450	.....	.....	1,900
Anderson-Prichard Oil Corp.:														
Arkansas City	25,000	26,000	5,000	[1]3,500	[1]7,500	4,800	[1]5,000	.....	.....	[2]2,200	.....	.....	.....	1,300

REFINING SURVEY (KANSAS Continued)

Company and Location	Crude Capacity BPCD	Crude Capacity BPSD	Charge — Barrels per Stream Day: Vacuum Distillate	Thermal Operations	Catalytic Cracking Fresh Feed	Catalytic Cracking Recycle	Catalytic Reforming	Hydrogen Treating Unit	Hydrogen Treating Feed	Production — Barrels per Stream Day: Alkylation	Polymerization	Lubes	Coke (Tons)	Asphalt
Century Refining Co., Inc.:														
Shallow Water	4,000	4,200	2,000	[1]1,200	.....	.....	.....	.....	.....	.....	.....	.....	.....	400
Chanute Refining Co.:														
Chanute	1,000	1,000	1,000	[2]1,000	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....
Cooperative Refinery Association:														
Coffeyville	24,500	25,000	6,000	[5]8,000	[1]10,000	9,500	[1]4,200	[1]2,200	Mid. dist.	[2]1,200	[2]500	1,200	150	1,200
Phillipsburg	12,000	13,000	4,500	.....	[1]5,000	4,500	[1]2,500	[1]3,500	Naphtha	.....	[2]750	.....	.....	1,500
Derby Refining Co.:														
Wichita	20,000	22,000	11,000	[1]3,000	[2]7,500	5,000	[5]2,500	[3]4,000	Naphtha	.....	[2]600	.....	.....	2,000
Mid-America Refining Co., Inc.:														
Chanute	2,375	2,500	1,350	[1]1,150	.....	.....	.....	.....	.....	.....	.....	.....	.....	350
Mobil Oil Co.:														
Augusta	40,000	42,000	13,200	[1]4,300	[2]14,800	8,000	[1]9,500	.....	.....	[2]1,700	.....	.....	.....	7,000
National Coop. Refinery Association:														
McPherson	30,000	32,000	.....	[1]2,000 [5]12,000	[1]12,000	6,000	[1]5,500	.....	.....	[2]2,300	[2]1,000	.....	250	.....
Phillips Petroleum Co.:														
Kansas City	66,000	(‡)	15,000	.....	[1]24,000	16,000	[1]16,000	.....	.....	.....	[2]1,700	2,400	.....	2,400
Skelly Oil Co.:														
El Dorado	45,000	48,000	12,000	[1]6,500	[1]20,000	2,500	[1]5,000	.....	.....	[2]3,500	[2]1,400	.....	.....	3,000
Standard Oil Co. (Ind.):														
Neodesha	23,100	24,300	.....	[6]5,200	[1]10,000	1,000	[6]6,000	[3]6,000	Naphtha	[1]1,300	.....	.....	85	.....
Vickers Petroleum Co., Inc.:														
Potwin	16,000	17,200	3,100	[1]2,500 [3]1,500	[2]6,500	2,000	[5]3,200	.....	.....	.....	[2]650	.....	.....	.....
Total	327,975	†346,500	80,150	51,850	123,300	63,300	61,900	15,700	.....	12,200	7,050	3,600	485	21,050

†State total includes crude capacity not reported, estimated on stream-day basis. ‡Not reported.

Kentucky

Ashland Oil & Refining Co.:														
Catlettsburg	75,000	80,000	18,000	[1]6,000 [3]2,000	[1]28,100	9,900	[15]6,500	[14]10,000	Naphtha	.....	[2]4,000	.....	.....	7,000
Louisville Refining Co., Inc.:														
Louisville	7,500	7,800	3,000	[1-2]2,500	[1]3,500	735	[1]2,000	[1]2,000	Naphtha	.....	[2]450	.....	.....	.....
Sohio Petroleum Co.:														
Latonia	16,500	18,000	10,000	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	5,000
Somerset Refining:														
Somerset	1,500	1,500	.....	.....	.....	.....	[12]400	.....	.....	.....	.....	.....	.....	.....
Total	100,500	107,300	31,000	10,500	31,600	10,635	8,900	12,000	.....	.....	4,450	.....	.....	12,000

Louisiana

Atlas Processing Co.:														
Shreveport**	§17,500	§19,000	.....	‡‡[3]2,000	.....	.....	[1]7,160	.....	.....	.....	‡‡[2]500	.....	.....	.....
Bay Petroleum Corp.:														
Chalmette	24,000	26,000	5,000	[2]12,000	[1]9,600	2,400	[1]6,000	.....	.....	.....	[2]900	.....	.....	.....
Bayou State Oil Corp.:														
Hosston	860	1,000	1,565	.....	.....	.....	.....	.....	.....	.....	.....	480	.....	245

REFINING SURVEY (LOUISIANA Continued)

Company and Location	Crude Capacity BPCD	Crude Capacity BPSD	Charge — Barrels per Stream Day: Vacuum Distillate	Thermal Operations	Catalytic Cracking: Fresh Feed	Catalytic Cracking: Recycle	Catalytic Reforming	Hydrogen Treating: Unit	Hydrogen Treating: Feed	Production — Barrels per Stream Day: Alkylation	Polymerization	Lubes	Coke (Tons)	Asphalt
Calumet Refining Co.:														
Princeton	1,800	2,000	2,000	.....	.....	.....	.....	.....	.....	.....	.....	800	.....	370
Canal Refining Co.:														
Church Point	2,000	2,000	.....	.....	.....	.....	[6]250	.....	.....	.....	.....	.....	.....	.....
Cities Service Refining Corp.:														
Lake Charles††	185,000	190,700	26,750	¶[2]12,000	[1]85,000	60,000	[2]19,000	.....	.....	[1]17,000	.....	.....	.....	.....
Continental Oil Co.:														
Westlake	53,000	56,000	.....	[1]6,100 [3]4,000 [5]10,000	[2]21,000	7,500	[1]6,800	.....	.....	[1]2,800	[1]670 [2]660	.....	325	.....
Cotton Valley Solvents, Inc.:														
Cotton Valley	‖4,800	‖5,000	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....
Esso Standard Oil Co.:														
Baton Rouge	364,200	377,200	130,000	[1]35,000 [2]14,000	[1]141,000	59,000	[2]27,800 [8]32,000	[2]3,600	Solvents	[1]25,000	[2]7,400	10,900	.....	8,300
Evangeline Refining Co., Inc.:														
Jennings	2,000	2,500	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....
Ingram Oil & Refining Co.:														
Meraux	20,000	20,800	6,500	.....	[1]5,200	2,000	[1]3,600	.....	.....	.....	[2]325	.....	.....	.....
Shell Oil Co.:														
Norco	95,000	100,000	45,000	[3]4,700 [5]9,500	[1]61,000	21,000	[1]16,800	[2]16,800	Naphtha	[1]7,400	[2]1,400	.....	.....	1,840
Total	770,160	802,200	216,815	109,300	322,800	151,900	119,410	20,400	.....	52,200	11,855	12,180	325	10,755

§Natural gasoline and cycle product charged to stills. ¶Combination thermal reforming-cracking unit being used primarily for visbreaking operations. ‖Fractionates crude and condensate into straightrun products. **Pentane and heavier isomerization unit operating 3,700 b.p.s.d. ††Butane isomerization unit operating 4,800 b.p.s.d. ‡‡Unit not operating, on standby.

Maryland

American Bitumuls & Asphalt Co.:														
Baltimore (Fairfield)	4,500	7,500	7,500	§[2]6,000	.....	.....	.....	.....	.....	.....	.....	.....	.....	6,000
American Oil Co.:														
Baltimore	9,000	9,300	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	5,500
Esso Standard Oil Co.:														
Baltimore	16,500	19,000	11,000	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	8,600
Total	30,000	35,800	18,500	6,000	.....	.....	.....	.....	.....	.....	.....	.....	.....	20,100

§Atmospheric unit can be operated as visbreaker during winter months only for production of Bunker C fuel oil.

Massachusetts

Esso Standard Oil Co.:														
Everett	50,000	55,000	13,100	.....	[1]18,000	14,000	[2]7,200	[2]7,200	Naphtha	.....	[2]1,800	.....	.....	10,000

Michigan

Aurora Gasoline Co.:														
Detroit	44,000	47,000	24,000	[2]7,000 [4]4,000	[1]17,000	3,000	[2]5,500	[1]10,000	Gas oil	.....	[2]1,400	.....	150	6,500
Elsie	6,000	6,700	.....	.....	.....	.....	[1]1,500	.....	.....	.....	.....	.....	.....	.....

REFINING SURVEY (MICHIGAN Continued)

Company and Location	Crude Capacity BPCD	Crude Capacity BPSD	Charge — Barrels per Stream Day: Vacuum Distillate	Thermal Operations	Catalytic Cracking: Fresh Feed	Catalytic Cracking: Recycle	Catalytic Reforming	Hydrogen Treating Unit	Hydrogen Treating Feed	Production — Barrels per Stream Day: Alkylation	Polymerization	Lubes	Coke (Tons)	Asphalt
Muskegon	14,500	16,000	8,000	.....	[1]7,000	1,400	[1]2,400	[1]700	Naphtha	.....	.....	.....	.....	3,000
Bay Refining Corp., Div. Dow Chemical Co.:														
Bay City	9,700	10,000	5,500	.....	[1]3,600	2,100	.....	.....	.....	.....	[2]750	.....	.....	.....
Crystal Refining Co.:														
Carson City	6,000	6,700	.....	[3]1,500	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....
Lakeside Refining Co.:														
Kalamazoo	4,000	4,200	.....	[1]1,500	.....	.....	[7]1,200	.....	.....	.....	.....	.....	.....	.....
Leonard Refineries, Inc.:														
Alma (Leonard Division)	9,500	10,500	9,000	.....	[1]7,500 [2]5,600	5,500 1,400	[5]2,400	[2]2,400 [2]1,400 [2]3,800	Naphtha Mid. dist. Cat feed	[2]1,100	.....	.....	.....	2,800
Alma (Mid-West Division)	10,000	11,000	.....	[1]3,800	.....	.....	[1]2,200	.....	.....	.....	[1]140	.....	.....	.....
Mount Pleasant (Roosevelt Div.)	7,500	7,700	.....	.....	.....	.....	[1]1,800	[1]2500	Naphtha	.....	.....	.....	.....	.....
Marvel Refining Co.:														
Grand Rapids	2,000	2,000	500	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....
Mobil Oil Co.:														
Trenton	35,500	37,300	.....	[5]6,500	[2]12,700	6,900	[1]39,200	[1]39,000	Naphtha	[1]3,700	.....	.....	200	.....
Naph-Sol Refining Co.:														
Muskegon	10,000	10,500	.....	[2]2,500	.....	.....	[1]1,100	.....	.....	.....	[2]60	.....	.....	.....
Osceola Refining Co.:														
Reed City	2,500	2,500	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....
Petroleum Specialists, Inc.:														
Flat Rock	6,000	6,500	.....	.....	.....	.....	[1]1,000	.....	.....	.....	.....	.....	.....	.....
West Branch Refineries, Inc.:														
West Branch	5,000	5,000	.....	.....	.....	.....	[4]1,150	[4]1,150	Naphtha	.....	.....	.....	.....	700
Total	172,200	183,600	47,000	26,800	53,400	20,300	29,450	28,950	.....	4,800	2,350	.....	350	13,000
Minnesota														
Great Northern Oil Co.:														
Pine Bend	31,400	33,000	.....	[5]12,000	[2]16,000	9,000	[5]5,000	[3]5,000 [3]8,500 [3]2,500	Naphtha Mid. dist. Hvy. cat. gaso.	.....	[2]1,000	.....	580	.....
International Refineries, Inc.:														
Wrenshall	15,000	16,700	.....	.....	[1]3,250	1,750	[6]2,800	[2]2,800	Naphtha	.....	[2]350	.....	.....	.....
Northwestern Refining Co.:														
New Brighton	2,500	2,500	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....
St. Paul Park	17,000	17,500	10,000	.....	[1]6,500	4,500	.....	.....	.....	.....	[2]500	.....	.....	5,000
Total	65,900	69,700	10,000	12,000	25,750	15,250	7,800	18,800	.....	.....	1,850	.....	580	5,000
Mississippi														
Pontiac Eastern Corp.:														
Hattiesburg	10,500	11,500	.....	[4]4,800	[2]9,300	16,300	[1]2,500	[1]1,200	Cat. cycle	[1]2,500	.....	.....	225	.....
Southland Co.:														
Sandersville	5,300	5,600	3,100	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	2,250
Total	15,800	17,100	3,100	4,800	9,300	16,300	2,500	1,200	.....	2,500	.....	.....	225	2,250

Company and Location	Crude Capacity BPCD	Crude Capacity BPSD	Charge — Barrels per Stream Day: Vacuum Distillate	Thermal Operations	Catalytic Cracking Fresh Feed	Catalytic Cracking Recycle	Catalytic Reforming	Hydrogen Treating Unit	Hydrogen Treating Feed	Production — Barrels per Stream Day: Alkylation	Polymerization	Lubes	Coke (Tons)	Asphalt
Missouri														
Standard Oil Co. (Ind.):														
Sugar Creek	76,100	80,000	7,200	[1]16,700 [2]2,900 [5]24,900	[1]32,000	2,000	[5]14,000	[2]20,000	Naphtha	[1]3,800	[2]1,800	.....	400	3,000
Montana														
Big West Oil Co. of Montana:														
Kevin	2,700	3,000	700	§[6]1,250	.....	.....	[1]1,000	[1]1,250	Naphtha	.....	[2]20	.....	.....	225
Carter Oil Co.:														
Billings	33,950	36,500	15,000	[4]3,800	[1]13,200	12,900	[6]2,700	[2]4,000 [2]2,700	Mid. dist. Cat. recycle	.....	[2]1,000	.....	200	7,000
Continental Oil Co.:														
Billings	10,200	11,200	.....	.....	[5]5,000	[5]5,900	[15]2,500	[7]7,500	(¶)	.....	[2]500	.....	.....	1,300
Farmers Union Cent. Exch.:														
Laurel	18,000	19,000	12,000	[2]5,500	[7]7,000	1,300	[1]4,450	[5]5,160 [7]7,100	Naphtha Mid. dist.	.....	[2]1,600	.....	.....	3,800
Jet Fuel Refinery Co.:														
Mosby	1,500	1,500	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....
Phillips Petroleum Co.:														
Great Falls	3,000	(‡)	1,600	.....	[1]1,200	1,800	.....	.....	.....	.....	[2]30	.....	.....	525
The Texas Co.:														
Sunburst	8,000	(‡)	.....	*[5]5,000	.....	.....	.....	.....	.....	.....	*[2]100	.....	.....	.....
Union Oil Co. of Calif.:														
Cut Bank	3,800	4,200	.....	[1]400 [2]2,300	.....	.....	[6]600	[1]900	Mid. dist.	.....	[1]75	.....	.....	.....
Unity Petroleum Corp.:														
Kalispell	1,000	1,200	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	500
Total†	82,150	88,100	29,300	18,750	26,400	21,900	11,250	28,610	.....	.....	3,335	.....	200	13,350
Nebraska														
Cooperative Refinery Association:														
Scottsbluff	2,800	3,000	.....	[1]1,100	.....	.....	[1]650	.....	.....	.....	.....	.....	.....	.....
New Jersey														
California Oil Co.:														
Perth Amboy	115,500	123,000	65,000	[2]5,000	[3]29,000	2,000	[1]12,500	.....	.....	[1]2,500	[2]400	.....	.....	5,500
Cities Service Oil Co. (Pa.):														
Linden	14,300	15,000	10,000	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	8,900
Esso Standard Oil Co.:														
Bayonne	25,000	28,500	15,000	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	8,200
Linden	168,000	175,000	73,800	[2]12,000 [3]8,500 [10]8,500	[1]83,500	33,500	[6]20,000	[2]20,000 [2]30,000 [2]15,000	Naphtha Mid dist. Other	[1]10,700	[2]6,700	.....	.....	.....
Hess Trading & Transport, Inc.:														
Sewaren	38,000	40,000	.....	.....	.....	.....	[1]4,000	[1]5,000 [1]5,000	Naphtha Mid. dist.	.....	.....	.....	.....	.....

*Barrels per calendar day. †State totals include crude capacities not reported and calendar-day figures converted to stream-day basis. ‡Not reported. §Charges topped crude. ¶Feed stock includes gasoline through diesel fuel from crude unit.

REFINING SURVEY (NEW JERSEY Continued)

Company and Location	Crude Capacity BPCD	Crude Capacity BPSD	Charge — Barrels per Stream Day: Vacuum Distillate	Thermal Operations	Catalytic Cracking Fresh Feed	Catalytic Cracking Recycle	Catalytic Reforming	Hydrogen Treating Unit	Hydrogen Treating Feed	Production — Barrels per Stream Day: Alkylation	Polymerization	Lubes	Coke (Tons)	Asphalt
Mobil Oil Co.:														
Paulsboro	87,000	91,400	41,000	.....	[2]26,000	8,700	[13]21,800	[13]21,800 [13]22,600	Naphtha Mid. dist.	[2]2,400	.....	8,000	.....	.....
Texas Co., The:														
Westville	70,000	(‡)	*25,000	*[2]12,000 *[3]9,000	*[1]35,000	(‡)	*[1]12,000	*[1]12,000 *[4]6,000	S.R. naph. Cat. dist.	*[1]2,300	*[2]2,500	.....	.....	.....
Total†	517,800	546,400	232,600	57,300	177,500	44,200	71,600	139,300	.....	18,200	9,900	8,000	.....	22,600

*Barrels per calendar day. †State totals include crude capacities not reported and calendar-day figures converted to stream-day basis. ‡Not reported.

New Mexico

Continental Oil Co.:														
Artesia	4,000	4,400	.....	[1]1,875	.....	.....	[4]1,500	[14]1,700	Naphtha	.....	.....	.....	.....	700
El Paso Natural Gas Products Co.:														
Bloomfield	2,500	2,500	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....
Gallup	7,200	8,000	2,480	.....	[1]1,560	520	[1]2,780	.....	.....	[2]750	.....	.....	.....	.....
Famariss Oil & Refining Co.:														
Monument	1,380	1,400	.....	.....	.....	.....	[1]650	[1]680	Naphtha	.....	.....	.....	.....	.....
Four States-Western Oil Ref. Co.:														
Flora Vista (Farmington)	2,000	2,000	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....
Malco Refineries, Inc.:														
Artesia	11,500	12,000	2,500	.....	[2]6,000	1,380	.....	.....	.....	[2]900	[2]400	.....	.....	1,400
Total	28,580	30,300	4,980	1,875	7,560	1,900	4,930	2,380	.....	1,650	400	.....	.....	2,100

New York

Frontier Oil Refining Co., Div. Ashland Oil & Refining Co.:														
North Tonawanda	29,000	30,000	15,000	.....	[1]11,000	4,000	[15]7,500	[14]10,000	Naphtha	.....	[2]1,000	.....	.....	3,000
Gulf Oil Corp.:														
Staten Island	17,000	18,500	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....
Mobil Oil Co.:														
Brooklyn	30,500	32,000	.....	.....	[2]14,800	8,000	.....	.....	.....	.....	[2]1,200	.....	.....	.....
Buffalo	26,000	27,300	6,300	.....	[2]11,600	6,200	[13]8,900	[13]8,900	Naphtha	[13]3,000	.....	.....	.....	2,300
Total	102,500	107,800	21,300	.....	37,400	18,200	16,400	18,900	.....	3,000	2,200	.....	.....	5,300

North Dakota

Standard Oil Co. (Ind.):														
Mandan	39,000	40,000	.....	.....	[1]14,000	10,000	[5]6,000	.....	.....	[2]1,630	[2]1,400	.....	.....	.....
Westland Oil Co.:														
Williston	2,000	2,500	.....	[1]1,000	.....	.....	[1]700	.....	.....	.....	.....	.....	.....	.....
Total	41,000	42,500	.....	1,000	14,000	10,000	6,700	.....	.....	1,630	1,400	.....	.....	.....

Ohio

American Bitumuls & Asphalt Co.:														
Cincinnati	5,500	10,000	10,000	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	7,500
Ashland Oil & Refining Co.:														
Canton	34,000	35,000	20,000	[1]5,000	[1]12,000	3,000	[15]7,500	[14]10,000	Naphtha	.....	[2]1,200	.....	.....	3,600

REFINING SURVEY (OHIO Continued)

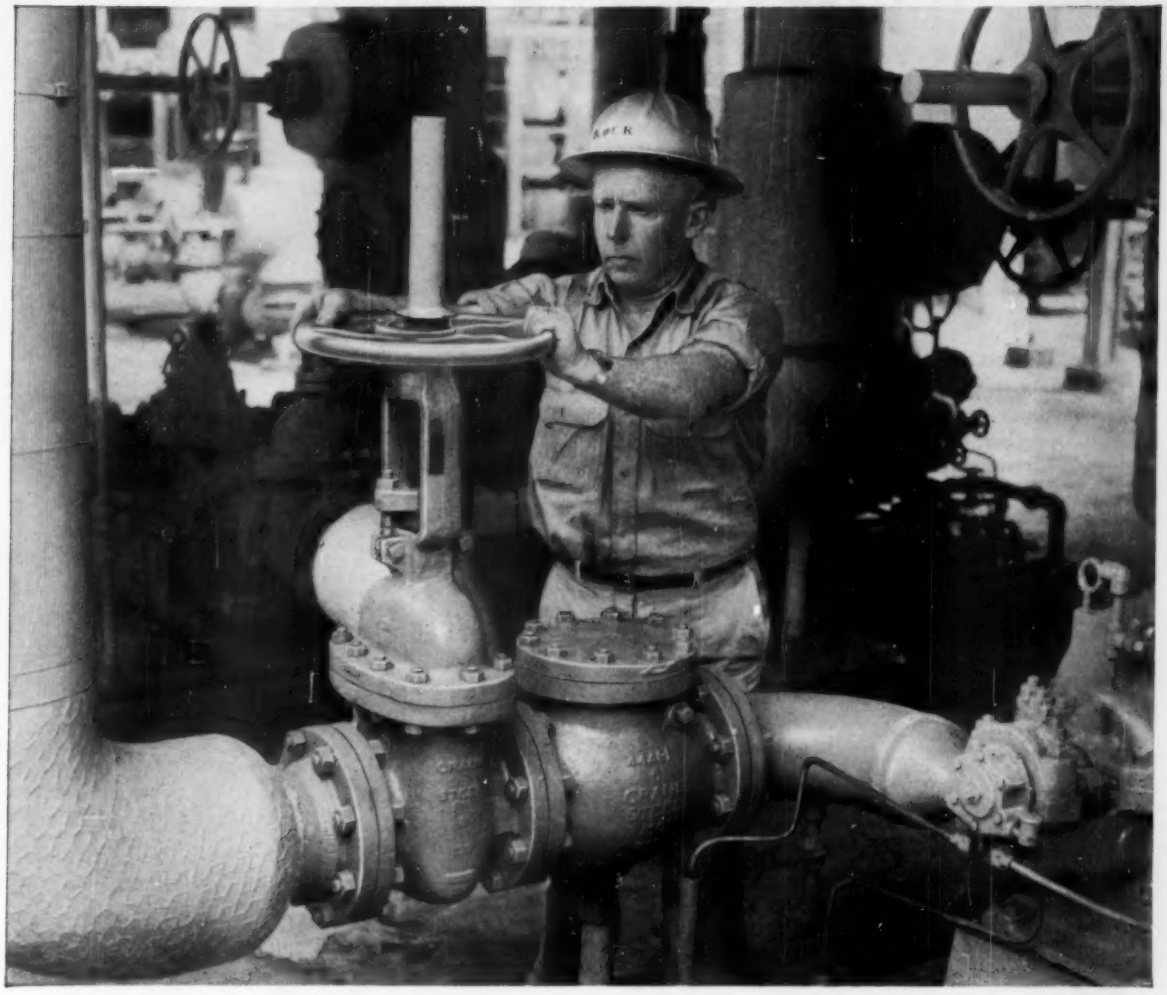
Company and Location	Crude Capacity BPCD	Crude Capacity BPSD	Charge — Barrels per Stream Day: Vacuum Distillate	Thermal Operations	Catalytic Cracking Fresh Feed	Catalytic Cracking Recycle	Catalytic Reforming	Hydrogen Treating Unit	Hydrogen Treating Feed	Production — Barrels per Stream Day: Alkylation	Polymerization	Lubes	Coke (Tons)	Asphalt
Gulf Oil Corp.:														
Cincinnati	35,317	36,000	7,000	[1]6,000	[1]14,100	4,900	[1]10,000	.....	.....	.....	[2]1,500	.....	.....	2,600
Toledo	43,070	45,000	8,200	[1]2,250 [2]2,920	[1]15,500	3,500	[1]10,000	.....	.....	.....	[2]1,300	.....	.....	.....
Midwest Refining Co. (formerly Dewese):														
Weston	500	500	500	.....	.....	.....	.....	.....	.....	.....	.....	300	.....	.....
Pure Oil Co.:														
Newark	19,000	(‡)	6,100	[1]6,400	[1]6,500	.....	[3]3,000	[11]3,000	Naphtha	.....	[2]450	.....	.....	.....
Toledo	38,400	(‡)	4,400	[1-2]5,100 [2]7,000	[1]11,600	7,400	[3]5,000	.....	.....	.....	[2]1,270	.....	150	.....
Standard Oil Co. (Ohio):														
Cleveland	52,000	55,000	18,000	[1]12,000	[2]21,000	7,000	[5]11,000	[3]11,000	Naphtha	[13]3,500	[2]1,000	1,600	.....	5,000
Lima	48,000	50,000	11,000	[5]11,000	[1]29,600	7,400	[1]12,000	[1]12,000 [1]1,000	Naphtha Mid. dist.	.....	[2]800	1,700	320	.....
Toledo	77,000	88,000	23,000	[1]8,000 [2]7,000 [5]15,000	[1]30,000	24,600	[7]12,000	[15]12,000 [15]10,500	Naphtha Other	[15]5,900	[2]2,350	.....	530	.....
Sun Oil Co.:														
Toledo	95,000	(‡)	.....	[*3]17,000	[*3]62,000	.....	[*1]14,700	.....	.....	[*1]1,400	.....	.....	.....	.....
Total†	447,787	479,800	108,200	106,370	208,500	57,800	86,700	59,500	.....	10,900	9,870	3,600	1,000	18,700

*Barrels per calendar day. †State totals include crude capacities not reported and calendar-day figures converted to stream-day basis. ‡Not reported.

Oklahoma

Allied Materials Corp.:														
Stroud	3,000	3,400	2,000	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	2,000
Anderson-Prichard Oil Corp.:														
Cyril	12,000	12,500	5,000	[1]1,900	[1]6,000	2,000	[6]1,000	[1]1,000	Naphth.	.....	[2]600	.....	.....	1,200
Bell Oil & Gas Co.:														
Grandfield	7,250	7,500	.....	[2]3,500	.....	.....	[1]1,900	.....	.....	.....	[2]150	.....	.....	.....
Ben Franklin Refining Co.:														
Ardmore	12,000	12,200	5,600	[1]2,400	[1]6,480	4,000	.....	.....	.....	[2]1,000	[2]250	.....	.....	1,200
Champlin Oil & Refining Co.:														
Enid	31,680	33,000	12,000	[1]4,000 [2]4,000	[1]10,000	5,000	[1]5,000	.....	.....	[2]1,500	[2]1,000	1,500	.....	1,500
Cities Service Oil Co. (Del.):														
Ponca City	35,000	37,500	10,500	[1]2,500 [6]1,600	[1]14,000	9,200	[9]6,000	.....	.....	.....	.....	.....	100	.....
Continental Oil Co.:														
Ponca City	65,000	68,000	10,800	[1]6,500 [3]4,000 [5]14,800	[4]22,500	11,000	[1]5,100 [16]11,000	[14]16,000	Naphtha	[2]5,000	[2]730	2,250	485	.....
D-X Sunray Oil Co.:														
Duncan	44,000	45,000	16,000	[5]11,000	[1]27,000	10,500	[1]6,000	[1]6,000	Naphtha	[2]3,500	[2]750	.....	400	.....
West Tulsa§	74,000	75,000	24,000	[5]8,500	[1]29,000	6,000	[1]19,500	[1]20,000	Naphtha	[1]2,300 [2]2,500	[2]2,000	6,500	300	.....
Kerr-McGee Oil Industries, Inc.:														
Cushing	21,500	22,000	3,900	[2]7,200	[1]7,600	3,200	.....	.....	.....	.....	[2]400	1,050	.....	400
Wynnewood	16,500	17,500	.....	.....	[1]7,000	3,800	[1]5,500	[1]4,000	Gas oil	.....	[2]500	.....	.....	2,000
Midland Cooperatives, Inc.:														
Cushing	11,850	13,000	.....	[2]6,000	[1]5,300	3,700	[1]2,580	.....	.....	.....	[2]950	.....	.....	.....
Phillips Petroleum Co.:														
Okmulgee	19,000	(‡)	8,000	.....	[2]7,000	3,000	.....	.....	.....	.....	[2]700	.....	.....	475

Gasoline Plant Cuts Valve Maintenance Costs



Crane Valves Do the Job After Others Fail

Six years ago this large gasoline plant in the Southwest, installed new gate and swing-check valves on hot water pump lines handling boiler make-up water.

Bonnet joint leaks and seat leakage developed after a short time. Maintenance costs jumped. After many attempts to stop the leakage, the bonnet joints were welded shut.

Two years ago the valves finally had to be replaced. Six-inch, 150-pound Crane steel gate and swing-check valves were installed.

Today these Crane valves continue to operate without any leakage at bonnets or seats, and without a penny spent for maintenance.

Why are the Crane valves still operating *with* 100% efficiency and *without* maintenance? *It's Crane quality*—in design, materials and workmanship—that makes the difference!

For information about Crane steel valves for all services—power and process fluids handling—see your Crane Representative, or write to the address below.

IDEAS FOR YOU—This free book gives you 32 case histories of important savings with quality valves. Ask for "Valve Performance Facts."

CRANE VALVES & FITTINGS

PIPE • PLUMBING • KITCHENS • HEATING • AIR CONDITIONING

Since 1855—Crane Co., General Offices: Chicago 5, Ill.—Branches and Wholesalers Serving All Areas

REFINING SURVEY (OKLAHOMA Continued)

Company and Location	Crude Capacity BPCD	Crude Capacity BPSD	Charge — Barrels per Stream Day: Vacuum Distillate	Thermal Operations	Catalytic Cracking Fresh Feed	Catalytic Cracking Recycle	Catalytic Reforming	Hydrogen Treating Unit	Hydrogen Treating Feed	Production — Barrels per Stream Day: Alkylation	Polymerization	Lubes	Coke (Tons)	Asphalt[§]
Texas Co., The:														
West Tulsa	39,000	(‡)	*12,000	*[1]9,000 *[3]5,000	*[1]15,000	.....	*[1]8,000	*[1]8,000	Naphtha	.....	*[2]1,500	.....	.....	.....
Total†	391,780	407,600	111,000	93,300	158,380	61,400	72,380	55,800	.....	15,800	9,680	11,300	1,285	8,775

*Barrels per calendar day. †State totals include crude capacities not reported and calendar-day figures converted to stream-day basis. ‡Not reported. §Includes a 2,400-bbl. per day butane isomerization unit.

Oregon

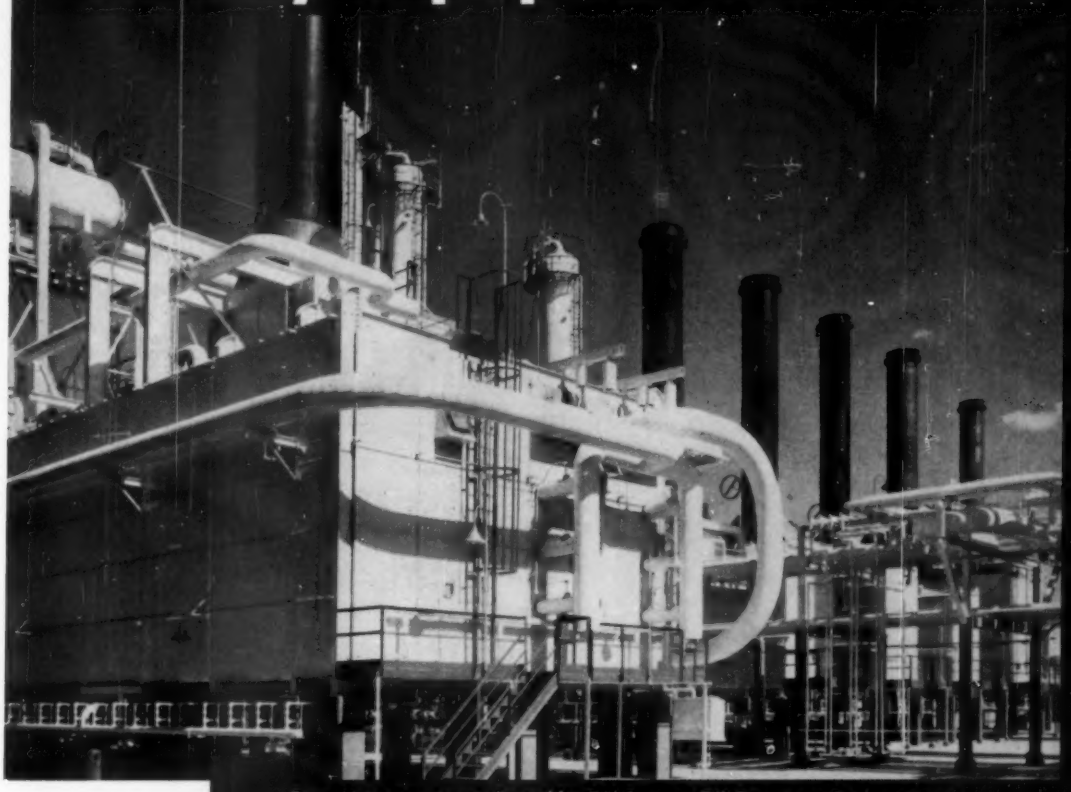
American Bitumuls & Asphalt Co.:														
Portland (Willibridge)	3,500	6,500	6,500	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	4,200

Pennsylvania

Atlantic Refining Co.:														
Philadelphia	148,000	156,000	45,000	.....	[1]48,000	22,000	[6]29,000	[1]15,000	Naphtha	*[1]5,400	*[2]1,700	*5,000	.....	*7,500
Franklin Refinery, Div. L. Sonneborn Sons, Inc.:														
Franklin	2,000	2,000	.....	.....	.....	.....	.....	.....	.....	.....	.....	500	.....	.....
Gulf Oil Corp.:														
Philadelphia	182,000	192,000	82,000	[2]24,000 [3]12,000	[1]61,200	28,800	[1]68,000	[5]50,000 §52,000	Mid. dist. Naphtha	[1]6,800	[2]3,600	.....	.....	.....
Kendall Refining Co.:														
Bradford	4,800	5,200	.....	.....	.....	.....	[1]1,500	[1]2,000	Naphtha	.....	.....	1,200	.....	.....
Pennsylvania Refining Co.:														
Karns City	1,300	1,500	520	.....	.....	.....	.....	.....	.....	.....	.....	325	.....	.....
Pennzoil Div., South Penn Oil Co.:														
Rouseville	10,000	10,400	3,500	.....	[1]3,600	360	[1]2,900	[1]3,650	.....	.....	[2]380	2,500	.....	.....
Quaker State Oil Refining Corp.:														
Emlenton	2,540	3,000	1,500	[1]750 [3]600	.....	.....	[1]1,000	.....	.....	.....	[2]75	1,700	.....	.....
Farmers Valley	3,810	4,500	.....	[1]1,350	.....	.....	[1]1,500	.....	.....	.....	[2]100	2,300	.....	.....
Sinclair Refining Co.:														
Marcus Hook	133,000	140,000	71,000	[1]5,000 [2]27,000	[1]40,000	10,000	[7]20,000	[10]10,000	Mid. dist.	.....	[2]1,850	.....	.....	.....
Sun Oil Co.:														
Marcus Hook	160,000	(‡)	.....	*[2]14,600 *[3]24,000	*[2]23,000 *[3]33,000 *[4]23,000	.....	*[4]32,000	.....	.....	*[2]7,000	.....	*11,800	.....	*800
United Refining Co.:														
Warren	15,000	15,600	4,500	.....	[1]5,000	2,500	[7]4,000	[1]750 [7]5,000	Mid. dist. Naphtha	.....	[2]375	.....	.....	1,500
Valvoline Oil Co., Div. Ashland Oil & Refining Co.:														
Freedom	5,500	6,000	2,000	.....	.....	.....	.....	.....	.....	.....	.....	800	.....	.....
Wolf's Head Oil Refining Co., Inc.:														
Reno	2,500	2,600	.....	.....	[1]920	.....	.....	.....	.....	.....	.....	750	.....	.....
Total†	670,450	706,800	210,020	113,300	245,620	63,660	163,400	138,400	.....	20,600	8,280	28,675	.....	10,700

*Barrels per calendar day. †State totals include crude capacities not reported and calendar-day figures converted to stream-d y basis. ‡Not reported. §Hydrobon unit.

BORN HEATERS help DX Sunray Refinery Step up Gasoline Octane



Born Heaters were selected by DX Sunray Oil Company for important heating requirements in their new West Tulsa refinery expansion.

While you are in Tulsa attending the I.P.E. we will be happy to make arrangements for you to inspect the Born Heaters at the DX Sunray Refinery.

Six Born Heaters supply more than 300,000,000 BTU hourly to the Isomerization, Alkylation, Platformer and Unifiner Units at the DX Sunray plant. The new units now produce 105-octane gasoline (the highest octane produced in commercial quantities) and other products.

Born heaters were selected because of their exclusive features providing greater fuel efficiencies, close control, economical, trouble-free operation, and many safety features.

For the complete story on a BORN HEATER to fit your needs, write, wire or call your BORN representative. He is anxious to serve you.

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Manufacturers of Direct-Fired "UPFLO" Heaters

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IN GREAT BRITAIN:
H. & E. Lintott, Ltd.
Horsham, Sussex, England

Company and Location	Crude Capacity BPCD	Crude Capacity BPSD	Charge — Barrels per Stream Day: Vacuum Distillate	Thermal Operations	Catalytic Cracking Fresh Feed	Catalytic Cracking Recycle	Catalytic Reforming	Hydrogen Unit	Treating Feed	Production — Barrels per Stream Day: Alkylation	Polymerization	Lubes	Coke (Tons)	Asphalt
Rhode Island														
Mobil Oil Co.:														
East Providence	8,500	8,900	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	7,000
Texas Co., The:														
East Providence	3,500	(‡)	*1,750	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	*1,500
Total†	12,000	12,600	1,900	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	8,700
South Carolina														
Esso Standard Oil Co.:														
Charleston	11,440	13,000	10,500	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	5,950
Tennessee														
Delta Refining Co.:														
Memphis	16,000	16,500	5,600	.....	[2]6,000	2,000	.....	.....	.....	[2]1,000	[2]400	.....	.....	2,500
Southern Oil Service:														
Nashville	300	800	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....
Total	16,300	17,300	5,600	.....	6,000	2,000	.....	.....	.....	1,000	400	.....	.....	2,500
Texas														
American Oil Co.:														
Texas City	145,000	157,000	27,000	[1]28,000 [2]25,500 [3]10,500	[1]66,000	2,000	[5]42,000	[3]45,000	Naphtha	[1]9,000	[2]3,000	.....	.....	5,000
American Petrofina Co. of Texas:														
Mount Pleasant	19,000	20,000	12,000	.....	[2]6,200	3,800	.....	.....	.....	.....	[2]550	.....	.....	5,200
Wichita Falls	9,000	10,000	.....	[1]2,600	[1]2,800	800	[1]3,000	.....	.....	.....	[2]250	.....	.....	.....
Anderson Ref. Corp. of Dallas:														
Tucker	3,400	3,400	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....
Atlantic Refining Co.:														
Port Arthur	62,000	65,000	19,000	.....	[1]21,700	9,300	[6]23,000	.....	.....	*[1]2,100	*150	.....	.....	.....
Bryson Pipeline & Refining Co.:														
Bryson	2,000	2,000	.....	.....	.....	.....	.....	.....	.....	.....	.....	190	.....	.....
Cactus Petroleum Co., Inc.:														
La Blanca	5,000	5,000	.....	.....	.....	.....	[6]750	.....	.....	.....	.....	.....	.....	.....
Col-Tex Refining Co.:														
Colorado City	11,600	12,000	8,000	[1]3,700	.....	.....	[1]2,000	[1]2,000	Naphtha	.....	[2]100	.....	.....	3,000
Continental Oil Co.:														
Wichita Falls	8,400	9,300	.....	[1]4,700 [3]1,350	.....	.....	[1&3]3,500	.....	.....	.....	[1]550 [2]200	.....	.....	.....
Cosden Petroleum Corp.:														
Big Spring	29,600	30,500	14,850	[1]5,000 [2]3,000	[1]14,000	.....	[1]4,500 [5]5,500	[1]2,200	Naphtha	[2]4,000	[2]1,000	.....	.....	3,900
Crown Central Petroleum Corp.:														
Houston	40,000	(‡)	.....	[1]8,500	[2]12,000	4,000	[4]5,500	[4]5,500	.....	.....	.....	.....	.....	.....
Danaho Refining Co.:														
Pettus	11,400	12,000	.....	.....	.....	.....	[1]1,000	.....	.....	.....	.....	.....	.....	.....
Delhi-Taylor Oil Corp.:														
Corpus Christi	40,000	42,000	.....	[2]2,400	[2]12,000	4,000	[1]15,000	[1]14,000 [3]1,000	Naphtha Other	.....	[2]500	.....	.....	.....

*Barrels per calendar day. †State totals include crude capacities not reported and calendar-day figures converted to stream-day basis. ‡Not reported.

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Shown below are results of comparable high output tests using the same base oil in a multicylinder engine. In Diagram A, no 702 had been added. The rings show severe scuffing and wear. In Diagram B ...*with* 702...the original tool marks are still present . . . rings show almost no wear or scuffing.

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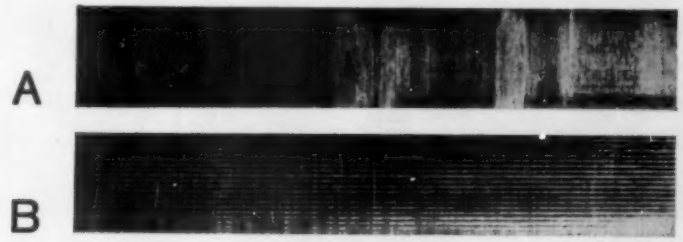

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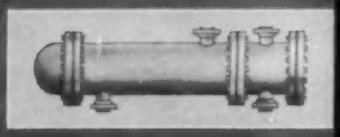

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REFINING SURVEY (TEXAS Continued)

Company and Location	Crude Capacity BPCD	Crude Capacity BPSD	Charge — Barrels per Stream Day: Vacuum Distillate	Thermal Operations	Catalytic Cracking Fresh Feed	Catalytic Cracking Recycle	Catalytic Reforming	Hydrogen Treating Unit	Hydrogen Treating Feed	Production — Barrels per Stream Day: Alkylation	Polymerization	Lubes	Coke (Tons)	Asphalt
Delhi-Taylor Oil Corp. and Mayfair Minerals, Inc.:														
Port Isabel	15,000	15,800	.....	.....	.....	.....	[1]4,000	.....	.....	.....	.....	.....	.....	.....
Eastern States Petroleum & Chemical Corp.:														
Houston	63,000	65,000	25,000	[2]20,000	[1]20,000	3,400	[1]12,500	[1]17,000 [1]12,000 [1]6,000	Naphtha Mid. dist. Other	[1]5,000	.....	.....	.....	.....
Eddy Refining Co.:														
Houston	2,000	2,000	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....
El Paso Natural Gas Products Co.:														
Odessa	7,200	8,000	3,940	.....	[1]2,640	880	[1]2,290	.....	.....	[2]1,250	.....	.....	.....	.....
Flint Chemical Co.:														
San Antonio	200	200	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....
Gratex Corp.:														
Graham	500	500	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....
Great Western Producers, Inc.:														
Irving	1,700	1,800	.....	.....	.....	.....	[7]1,200	.....	.....	.....	.....	.....	.....	.....
Gulf Oil Corp.:														
Port Arthur	278,490	294,000	129,500	[1]2,500 [2]23,500 [3]20,500	[1]91,250	33,750	[1]55,000	[5]50,000 [16]55,000	Mid. dist. Naphtha	[1]8,000	[2]6,000	13,000	.....	.....
Howell Refining Co.:														
Corpus Christi	4,800	5,000	1,000	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....
San Antonio	2,900	3,000	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....
Humble Oil & Refining Co.:														
Baytown	283,900	300,100	131,000	.....	[1]137,400	28,600	[5]46,000	[2]43,000 [2]6,000 [2]9,800 [2]14,000	Mid. dist. Solv. dist. Lube Hvy. cr. naph.	[1]14,500	[2]5,600	19,500	.....	2,900
La Gloria Oil & Gas Co.:														
Tyler	24,000	25,000	.....	[1]3,000 [5]8,500	[1]10,000	5,000	[1]5,000	.....	.....	[1]2,400	[2]700	.....	100	.....
Magnolia Petroleum Co.:														
Beaumont	220,000	237,000	49,000	[2]36,500 [3]10,000	[2]80,000	20,000	[13]24,000	[13]54,000	Naphtha	[1]14,300	.....	6,400	.....	.....
Monarch Refining Co.:														
San Antonio	2,500	2,500	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....
Petroleum Refining Co.:														
Lueders	2,700	3,000	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....
Phillips Petroleum Co.:														
Phillips§	71,000	(‡)	17,000	[2]4,500	[1]38,000 [5]11,000	2,000	[1]16,000	[14]10,000	Mid. dist.	[2]8,500	[2]750	.....	.....	.....
Sweeny	95,000	(‡)	17,000	.....	[1]24,000	6,000	[1]32,000	.....	.....	[2]5,000	.....	.....	.....	.....
Pontiac Refining Corp.:														
Corpus Christi	44,000	46,000	7,000	.....	[1]7,200	2,170	[1]13,000	[1]6,000	Naphtha	.....	[2]550	.....	.....	.....
Premier Oil Refining Co. of Tex., Div. City Products Corp.:														
Baird	2,350	2,500	.....	[1]1,200	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....
Fort Worth	7,900	8,000	1,700	[2]2,200	[1]3,000	2,700	[1]1,700	.....	.....	.....	[2]290	.....	.....	.....
Longview	5,800	6,000	.....	[1]3,000	.....	.....	[1]1,500	[1]1,500	Naphtha	.....	[2]90	.....	.....	.....
Pure Oil Co.:														
Nederland	78,900	(‡)	20,000	[1]10,500	[1]20,000 [2]17,100	7,500 2,900	[5]15,000	[15]20,000	Naphtha	[1]2,850	[2]825	2,000	.....	.....
Rado Refining Co.:														
McAllen	1,500	1,500	1,500	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....

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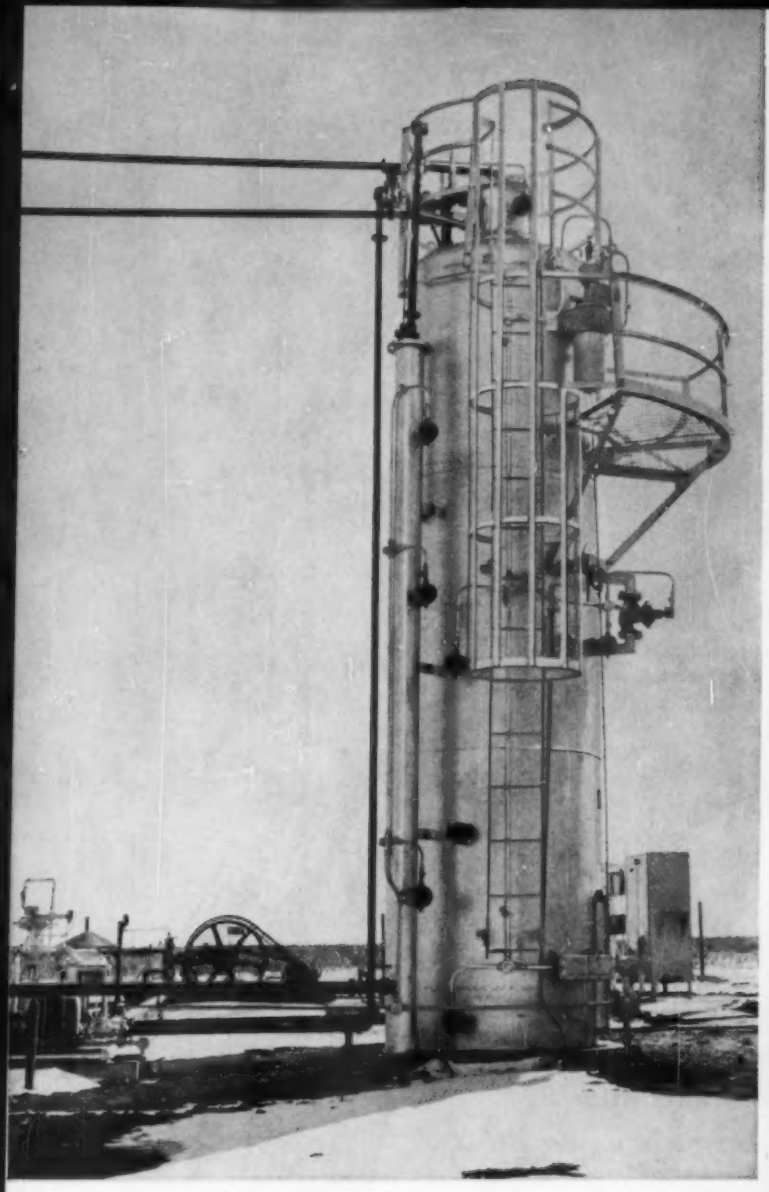
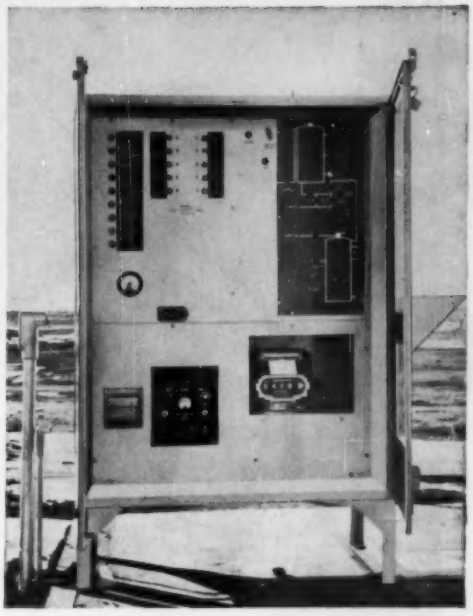
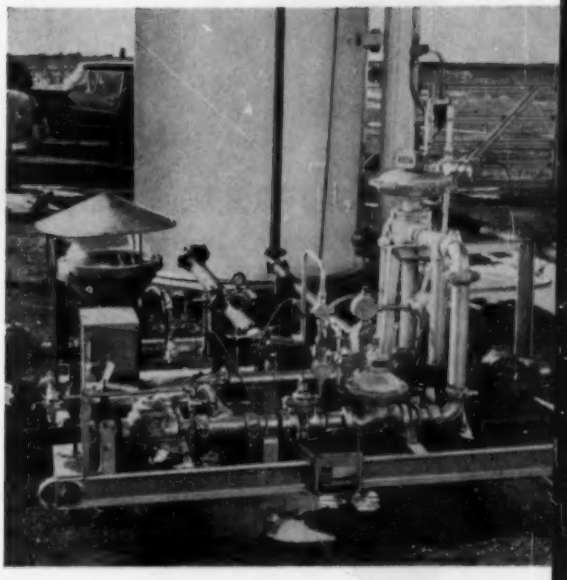
REFINING SURVEY (TEXAS Continued)

Company and Location	Crude Capacity BPCD	Crude Capacity BPSD	Charge — Barrels per Stream Day: Vacuum Distillate	Thermal Operations	Catalytic Cracking Fresh Feed	Catalytic Cracking Recycle	Catalytic Reforming	Hydrogen Treating Unit	Hydrogen Treating Feed	Production — Barrels per Stream Day: Alkylation	Polymerization	Lubes	Coke (Tons)	Asphalt
Republic Oil Refining Co.:														
Texas City	42,500	45,000	15,000	.....	[1]18,000	5,500	[1]7,400	.....	.....	[1]1,500	[2]750	.....	.....	.....
Shamrock Oil & Gas Corp.:														
Sunray¶	21,000	22,000	8,000	[1]3,900	[3]12,000	1,500	[1]4,000	[1]7,000	Naphtha	[1]4,000	.....	.....	.....	850
Shell Oil Co.:														
Houston	125,000	132,000	63,000	[3]13,000 [5]32,500	[1]42,000	.....	[1]32,500	[7]17,000	Naphtha	[1]5,800	.....	4,400	.....	1,700
Sinclair Refining Co.:														
Corpus Christi	29,000	31,000	.....	[1]7,000 [2]3,000	[4]12,000	3,000	[7]7,500	[10]7,500	Naphtha	[2]1,700	.....	.....	.....	.....
Houston	138,000	150,000	43,000	[1]10,000 [2]14,000	[1]50,000 [2]10,000	12,500 1,100	[7]30,000	[10]30,000 [10]25,000	Naphtha Mid. dist.	[1]2,400	.....	4,250	.....	.....
Skelly Oil Co.:														
Longview	4,500	5,000	.....	[1]3,300	.....	.....	[1]1,500	[1]400	Naphtha	.....	[2]100	.....	.....	.....
Southwestern Oil & Refining Co.:														
Corpus Christi	33,000	35,000	9,000	.....	[1]8,250	825	[1]10,000	.....	.....	.....	.....	.....	.....	1,000
Standard Oil Co. of Texas:														
El Paso	75,000	82,000	24,600	[9]9,000	[1]13,500 [3]11,000	13,500 4,000	[1]5,500	.....	.....	[1]1,600	[2]2,025	.....	.....	.....
Suntide Refining Co.:														
Corpus Christi	63,200	65,000	13,000	.....	[1]18,000	15,000	[1]11,000	[1]6,000	Naphtha	[2]2,200	[2]450	.....	.....	.....
Texas Asphalt & Refining Co.:														
Pasadena	4,500	5,000	5,000	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	4,000
Texas-Calgary Co.:														
Carrizo Springs	12,590	3,000	.....	[1]1,250	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....
Texas City Refining, Inc.:														
Texas City	34,000	35,000	11,500	[2]5,000	[3]16,000	1,600	[4]7,000	[6]7,000	Naphtha	[2]2,700	.....	.....	.....	.....
Texas Co., The:														
Amarillo	19,000	(‡)	.....	*[2]2,000 *[3]3,500	*[1]8,000	.....	*[1]4,500	*[1]4,500	Naphtha	*[1]800	*[2]400	.....	*100	.....
El Paso	16,000	(‡)	.....	*[2]2,000 *[3]3,500	*[1]7,000	.....	*[1]3,500	*[1]3,500	Naphtha	.....	*[2]500	.....	*100	.....
Port Arthur	280,000	(‡)	*100,000	*[1]70,000 *[3]17,500 *[6]6,700	*[1]120,000	.....	*[1]40,000	*[1]40,000	Naphtha	*[1]13,800	*[2]1,800	*17,000	*200	.....
Port Neches	40,000	(‡)	*22,000	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	*9,000
Texas Gas Corp.:														
Winnie	6,800	7,000	.....	.....	.....	.....	[2]2,500	.....	.....	.....	.....	.....	.....	.....
Three Rivers Refinery:														
Three Rivers	1,500	1,500	500	.....	.....	.....	.....	.....	.....	.....	.....	750	.....	150
Tydal Co.:														
Gainesville	2,000	2,000	.....	.....	.....	.....	.....	.....	.....	.....	.....	200	.....	.....
Western Natural Gas Co. (formerly McBride):														
Brownsville	3,500	3,900	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....
Wickett Refining Co.:														
Wickett	3,500	3,500	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....
Total†	2,546,330	2,695,100	811,390	480,500	956,740	197,475	507,240	527,300	.....	115,400	27,435	69,590	540	37,700

*Barrels per calendar day. †State totals include crude capacities not reported and calendar-day figures converted to stream-day basis. ‡Not reported. §16,000 b.p.d. of 95% isopentane produced at neighboring Rice gasoline plant, using Penex process. ¶Butane isomerization unit producing 2,000 b.p.d. product.







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BS&B

ANOTHER EXAMPLE OF PRODUCT LEADERSHIP

BLACK, SIVALLS & BRYSON, INC., DEPT. 1-A3A, P. O. BOX 1714, OKLAHOMA CITY

Company and Location	Crude Capacity BPCD	Crude Capacity BPSD	Charge — Barrels per Stream Day: Vacuum Distillate	Thermal Operations	Catalytic Cracking: Fresh Feed	Catalytic Cracking: Recycle	Catalytic Reforming	Hydrogen Treating: Unit	Hydrogen Treating: Feed	Production — Barrels per Stream Day: Alkylation	Polymerization	Lubes	Coke (Tons)	Asphalt
Utah														
Phillips Petroleum Co.:														
Woods Cross	12,500	(‡)	3,000	.....	[2]5,500	4,500	.....	.....	.....	.....	[2]400	.....	.....	1,350
Salt Lake Refining Co.:														
Salt Lake City	43,000	45,000	27,000	.....	[1]7,000 [2]8,000	2,000 5,000	[1]6,000	.....	.....	.....	.....	.....	.....	.....
Sure Seal Corp.:														
Woods Cross	700	700	700	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....
Uinta Oil Refining Co.:														
Jensen	1,500	1,700	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....
Utah Oil Refining Co.:														
Salt Lake City	35,000	35,700	.....	[1]7,000	[1]17,400	.....	[5]5,500	.....	.....	[1]5,000	[2]700	120	.....	1,500
Western States Refining Co.:														
North Salt Lake City	7,500	7,500	.....	[1]1,500	.....	.....	[4]1,000	[4]1,000	Naphtha	.....	.....	.....	.....	.....
Total†	100,200	103,700	30,700	8,500	37,900	11,500	12,500	1,000	.....	5,000	1,100	120	.....	2,850

†State totals include crude capacities not reported and calendar-day figures converted to stream-day basis. ‡Not reported.

Virginia														
American Oil Co.:														
Yorktown (Goodwin Neck)	33,000	35,000	19,000	[5]12,500	[1]22,000	8,000	[5]7,600	[3]7,600 [3]15,000	Naphtha Mid. dist.	.....	[2]2,500	.....	600	.....
Washington														
American Bitumuls & Asphalt Co.:														
Richmond Beach	1,000	3,500	3,500	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	2,600
General Petroleum Corp.:														
Ferndale	35,000	37,000	10,000	[2]6,600	[2]14,800	8,200	[13]15,000	.....	.....	.....	[2]1,300	.....	.....	.....
Shell Oil Co.:														
Anacortes	55,000	57,800	20,000	.....	[1]23,000	11,500	[1]8,500	[7]8,500	Naphtha	[1]2,500	[2]4,000	.....	.....	.....
Texas Co., The:														
Anacortes	45,000	(‡)	*18,000	.....	*[1]25,000	.....	*[1]8,000	**[4]20,000	Naphtha	*[1]2,300	*[2]1,100	.....	.....	.....
Union Oil Co. of California:														
Edmonds	4,000	4,500	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	3,100
U. S. Oil & Refining Co.:														
Tacoma	10,000	11,700	.....	[1]2,000	.....	.....	[4]2,500	[1]2,500	Naphtha	.....	[2]100	.....	.....	.....
Total†	150,000	161,700	53,500	8,600	65,600	19,700	34,900	33,200	.....	5,100	6,600	.....	.....	5,700

*Barrels per calendar day. †State totals include crude capacities not reported and calendar-day figures converted to stream-day basis. ‡Not reported.

West Virginia														
Elk Refining Co.:														
Falling Rock	4,200	4,500	2,000	[1]1,000	.....	.....	[1]2,000	[1]2,500	Naphtha	.....	[1]80	1,000	.....	.....
Quaker State Oil Refining Co.:								[1]500	Sp. naphthas					
St. Mary's	2,370	2,800	.....	[1]750 [3]600	.....	.....	[1]1,000	.....	.....	.....	[2]75	600	.....	.....
Total	6,570	7,300	2,000	2,350	.....	.....	3,000	3,000	.....	.....	155	1,600	.....	.....

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SPIRAL-WOUND GASKETS

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*Flexitallic is a registered tradename. No one else can make a Flexitallic Gasket. Look for *Flexitallic Blue* —, it's our exclusive blue-dyed Canadian asbestos filler.

Company and Location	Crude Capacity BPCD	Crude Capacity BPSD	Charge — Barrels per Stream Day: Vacuum Distillate	Thermal Operations	Catalytic Cracking Fresh Feed	Catalytic Cracking Recycle	Catalytic Reforming	Hydrogen Unit	Treating Feed	Production — Barrels per Stream Day: Alkylation	Polymerization	Lubes	Coke (Tons)	Asphalt
Wisconsin														
Empire Petroleum Co.:														
Sheboygan	5,000	5,500	4,000	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	2,200
Murphy Corp. (formerly Lake Superior Refining Co.'s plant):														
Lake Superior	14,000	15,000	5,000	[1]1,500	.....	.....	[3]3,500	[2]2,000	Gas oil	.....	.....	.....	.....	2,500
Total	19,000	20,500	9,000	1,500	.....	.....	3,500	2,000	.....	.....	.....	.....	.....	4,700
Wyoming														
C & H Refinery:														
Lusk	200	200	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....
Empire State Oil Co.:														
Thermopolis	4,800	5,000	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....
Frontier Refining Co.:														
Cheyenne	20,500	21,000	9,000	[1]1,000	[9]9,000	1,500	[2]2,500	[1]1,800 [1]1,700	Cat. cycle Mid dist.	.....	[2]800	.....	.....	2,400
Husky Hi-Power, Inc.:														
Cody	6,500	7,200	4,000	.....	.....	.....	[6]1,000	[1]1,000	35 API dist.	.....	.....	.....	.....	2,700
Mobil Oil Co.:														
Casper	12,500	13,100	.....	[1]1,700	[5]5,000	3,300	[13]3,300	[13]3,300 [13]4,300	Naphtha Mid. dist.	.....	[2]400	.....	.....	1,500
Sinclair Refining Co.:														
Sinclair	24,000	26,000	9,000	[2]2,000 [2]2,000	[11]11,000	2,750	.....	.....	.....	[1]1,700	[2]350	.....	.....	1,000
Sioux Oil Co.:														
Newcastle	5,600	6,000	.....	[3]3,000	.....	.....	[4]750	.....	.....	.....	[2]75	.....	.....	.....
Standard Oil Co. (Ind.):														
Casper	17,000	21,000	11,800	[4]4,800 [6]2,500	[9]9,120	380	[8]3,750	[5]5,000	Naphtha	[1]900	.....	840	120	3,000
Texas Co., The:														
Casper	17,000	(‡)	*9,000	*[5]4,000	*[16]6,000	.....	*[14]4,000	*[14]4,000	Naphtha	.....	*[2]500	.....	*100	*1,500
Total†	108,100	117,300	43,800	21,400	40,820	7,930	15,700	21,500	.....	2,600	2,225	840	220	12,200

*Barrels per calendar day. †State totals include crude capacities not reported and calendar-day figures converted to stream-day basis. ‡Not reported.

Puerto Rico														
Caribbean Refining Co.:														
Bayamon	14,400	15,000	9,600	.....	[18]8,500	4,600	.....	.....	.....	.....	[2]460	.....	.....	.....
Commonwealth Oil Refining Co., Inc.:														
Guayanilla	61,750	65,000	42,200	[2]20,000	[3]26,800	26,800	[4]7,460	.....	.....	[1]1,400	[2]2,370	.....	.....	.....
Total	76,150	80,000	51,800	20,000	35,300	31,400	7,460	.....	.....	1,400	2,830	.....	.....	.....

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Report on Canadian Operating Refineries

Location and capacities as of January 1, 1959

Province	No. Plants	Crude Capacity BPSD	Crude Capacity BPCD	Charge — Barrels Per Stream Day: Vacuum Distillate	Thermal Operations	Catalytic Cracking: Fresh Feed	Catalytic Cracking: Recycle	Catalytic Reforming	Hydro-treating	Production — Barrels Per Stream Day: Alkylation	Polymeri-zation	Lubes	Coke (Tons)	Asphalt
Alberta	10	83,670	91,010	19,150	25,550	14,900	9,200	14,875	10,875	870	560	2,000	125	6,525
British Columbia	6	96,000	101,500	42,130	5,500	29,070	14,120	16,300	23,350	1,050	2,085	.....	.....	5,870
Manitoba	4	33,630	36,150	12,160	1,375	12,260	5,780	7,400	5,200	.....	510	.....	.....	820
New Brunswick	1	300	300	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....
Northwest Territories	1	1,350	1,600	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....
Nova Scotia	1	49,000	54,400	24,000	.....	15,000	12,000	7,000	4,900	.....	2,000	.....	.....	1,500
Ontario	7	227,530	249,350	91,700	57,500	71,900	35,240	47,420	16,800	.....	2,620	4,420	25	7,020
Quebec	5	263,500	282,850	100,000	37,200	102,700	26,740	48,000	62,550	3,000	6,130	330	80	18,300
Saskatchewan	8	63,250	69,000	26,380	18,430	21,100	18,950	6,050	7,300	.....	2,140	.....	245	3,250
Total	43	818,230	886,160	315,520	145,555	266,930	122,030	147,045	130,975	4,920	16,045	6,750	475	43,285

Note: Legend for identifying types of processes is found at the beginning of U. S. report of operating refineries.

Company and Location	Crude Capacity BPCD	Crude Capacity BPSD	Charge — Barrels per Stream Day: Vacuum Distillate	Thermal Operations	Catalytic Cracking: Fresh Feed	Catalytic Cracking: Recycle	Catalytic Reforming	Hydrogen Treating Unit	Hydrogen Treating Feed	Production — Barrels per Stream Day: Alkylation	Polymeri-zation	Lubes	Coke (Tons)	Asphalt
Alberta														
Anglo-American Exploration, Ltd.:														
Hartell	3,800	4,000	400	[1]1,350	.....	.....	[6]1,000	.....	.....	.....	[2]60	.....	.....	.....
British American Oil Co., Ltd.:														
Calgary	6,750	7,500	2,500	[2]2,500	.....	.....	[6]2,000	.....	.....	.....	.....	.....	.....	600
Edmonton	7,650	8,500	.....	[1]1,400 [5]2,100	[12]2,000	2,000	[6]5,400	[15]6,300	Naphtha	.....	.....	.....	65	.....
Canadian Husky Oil, Ltd.:														
Lloydminster	7,820	8,500	2,100	.....	.....	.....	[12]400	[15]1,000	Mid. dist.	.....	.....	.....	.....	3,200
Excelsior Refineries, Ltd.:														
Lloydminster	3,550	4,000	2,350	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	2,000
Imperial Oil, Ltd.:														
Calgary	8,000	9,410	.....	[3]5,400	.....	.....	.....	.....	.....	[1]870	.....	.....	.....	725
Edmonton	28,500	30,000	10,300	[3]6,000	[18]8,500	5,100	[6]2,200	[2]2,700	Naphtha & lubes	.....	.....	2,000	.....	.....
North Star Oil, Ltd.:														
Grande Prairie	2,100	2,500	.....	[1]1,000	.....	.....	[7]875	[11]875	Naphtha	.....	.....	.....	.....	.....
Texaco Canada, Ltd.:														
Edmonton	12,000	12,600	.....	[3]3,000 [5]2,200	[14]4,400	2,100	[3]3,000	.....	.....	.....	[2]500	.....	60	.....
Wainwright Producers & Refiners, Ltd.:														
Wainwright	3,500	4,000	1,500	[2]600	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....
Total	83,670	91,010	19,150	25,550	14,900	9,200	14,875	10,875	.....	870	560	2,000	125	6,525

with Davison Catalysts

Your stack carries away regeneration gases —not catalyst—when you put Davison in your unit. Here's why:

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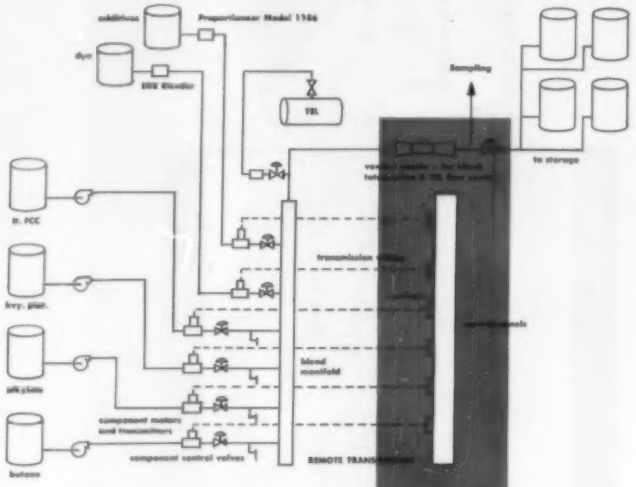

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REMOTE TRANSMISSION between blender and manifold . . . a unique feature on all four Proportioneers blenders (regular gasoline, premium gasoline, jet fuel, fuel oil) used at Texaco's modern Anacortes refinery . . . won immediate approval of:

TEXACO . . . *total installed costs* less than alternative systems.

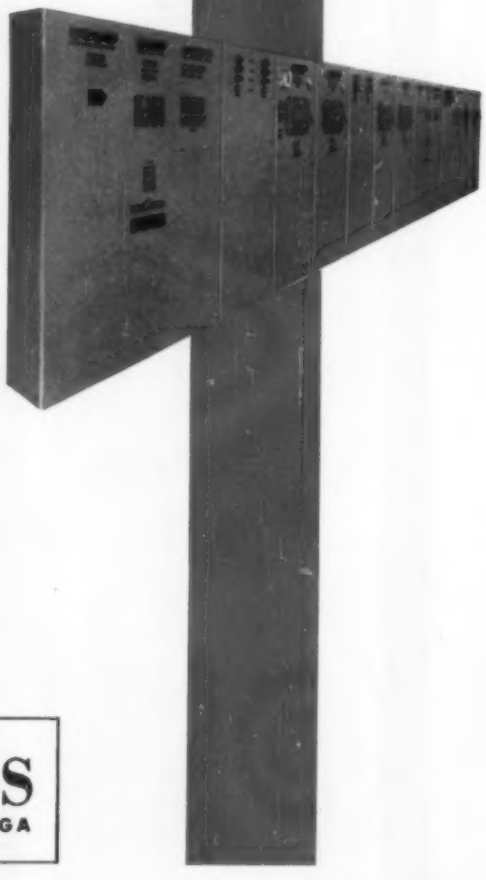
PROJECT ENGINEER . . . *maximum installation flexibility* facilitated changes in process and formulation demands without changing piping requirements, increasing costs.

PIPING ENGINEER . . . *time and labor saving* remote transmission eliminated need to locate meters, control valves and manifolds in an exact spot near blender building.

FIELD ENGINEER . . . *ease of installation.* all in-field piping and controls of *standard* design.

TEXACO OPERATORS . . . *no special controls* required for *this* remote system . . . simplified *standard* controls make job easier.

Investigate economical fingertip formulation, greater processing flexibility of Proportioneers Stream Blender. Accuracy ½ of 1% guaranteed in writing. Write **B-I-F Industries, Inc., Dept. P, 377 Harris Avenue, Providence 1, R. I.**



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Company and Location	Crude Capacity BPCD	Crude Capacity BPSD	Charge — Barrels per Stream Day: Vacuum Distillate	Thermal Operations	Catalytic Cracking: Fresh Feed	Catalytic Cracking: Recycle	Catalytic Reforming	Hydrogen Treating Unit	Hydrogen Treating Feed	Production — Barrels per Stream Day: Alkylation	Polymerization	Lubes	Coke (Tons)	Asphalt
British Columbia														
British American Oil Co., Ltd.:														
Port Moody	18,000	20,000	9,000	.....	[1]9,000	4,500	[2]4,000	[3]7,200	Naphtha	[1]1,050	.....	.....	.....	.....
Imperial Oil, Ltd.:														
Ioco	32,000	34,000	13,600	.....	[1]8,100	4,050	[5]5,550	[2]3,850	Naphtha	.....	[2]1,125	.....	.....	820
Pacific Petroleums, Ltd.:														
Dawson Creek	2,250	2,500	1,350	[1]1,000	.....	.....	[4]500	[4]500	Naphtha	.....	.....	.....	.....	350
Royalite Oil Co., Ltd.:														
Kamloops	4,750	5,000	2,180	.....	[1]1,470	770	[1]1,000	.....	.....	.....	[2]110	.....	.....	700
Shell Oil Co. of Canada, Ltd.:														
Vancouver (Shellburn plant)	21,000	22,000	8,000	[2]4,500	[1]6,000	300	[1]2,500	[1]2,500 [8]9,300	Naphtha Mid. dist.	.....	[2]400	.....	.....	2,000
Standard Oil Co. of B. C., Ltd.:														
North Burnaby	18,000	18,000	8,000	.....	[1]4,500	4,500	[1]2,750	.....	.....	.....	[2]450	.....	.....	2,000
Total	96,000	101,500	42,130	5,500	29,070	14,120	16,300	23,350	.....	1,050	2,085	.....	.....	5,870
Manitoba														
Anglo-Canadian Oils, Ltd.:														
Brandon	2,630	3,000	.....	[1]1,375	.....	.....	[1]1,000	.....	.....	.....	[2]50	.....	.....	.....
Imperial Oil, Ltd.:														
Winnipeg	18,000	19,150	7,300	.....	[1]7,000	2,100	[8]3,700	[2]2,500	Naphtha	.....	.....	.....	.....	820
North Star Oil, Ltd.:														
St. Boniface	12,500	13,500	4,860	.....	[1]5,260	3,680	[1]2,700	[1]2,700	Naphtha	.....	[2]460	.....	.....	.....
Rado Oil Refineries, Ltd.:														
East Kildonan	500	500	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....
Total	33,630	36,150	12,160	1,375	12,260	5,780	7,400	5,200	.....	.....	510	.....	.....	820
New Brunswick														
New Brunswick Oilfields, Ltd.:														
Weldon	300	300	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....
Northwest Territories														
Imperial Oil, Ltd.:														
Norman Wells	1,350	1,600	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....
Nova Scotia														
Imperial Oil, Ltd.:														
Halifax	49,000	54,400	24,000	.....	[1]15,000	12,000	[8]7,000	[2]4,900	Naphtha	.....	[2]2,000	.....	.....	1,500
Ontario														
British American Oil Co., Ltd.:														
Clarkson	55,350	61,500	28,000	[1]4,500	[1]11,600	5,800	[6]10,000	[15]12,000	Naphtha	.....	[2]1,260	1,220	.....	4,000
Canadian Husky Oil, Ltd.:														
Fort William	3,680	4,000	1,300	.....	.....	.....	[6]1,000	[9]1,000	Mid. dist.	.....	.....	.....	.....	820
Canadian Oil Companies, Ltd.:														
Corunna	27,400	30,000	15,000	[2]3,500	[1]13,200	8,800	[1]10,400	.....	.....	.....	[2]700	.....	.....	.....
Cities Service Oil Co., Ltd.:														
Bronte	18,600	20,000	8,200	.....	[1]6,000	7,500	[7]3,820	.....	.....	.....	.....	.....	.....	.....

REFINING SURVEY (ONTARIO Continued)

Company and Location	Crude Capacity BPCD	Crude Capacity BPSD	Charge — Barrels per Stream Day: Vacuum Distillate	Thermal Operations	Catalytic Cracking Fresh Feed	Catalytic Cracking Recycle	Catalytic Reforming	Hydrogen Treating Unit	Hydrogen Treating Feed	Production — Barrels per Stream Day: Alkylation	Polymerization	Lubes	Coke (Tons)	Asphalt
Imperial Oil, Ltd.:														
Sarnia	87,500	95,100	30,000	[1]4,500 [2]4,500 [3]8,900 [5]28,000	[1]22,000	8,800	[5]16,600	[2]3,800	Lubes, wax & naphtha	.....	.....	3,200	25	2,200
Regent Refining (Canada), Ltd.:														
Port Credit	20,000	23,000	9,200	[2]3,600	[1]7,000	4,340	[1]2,500	.....	.....	.....	[2]660	.....	.....	.....
Sun Oil Co., Ltd.:														
Sarnia	15,000	(‡)	.....	.....	[*3]11,000	.....	[*4]3,000	.....	.....	.....	.....	.....	.....	.....
Total†	227,530	249,350	91,700	57,500	71,900	35,240	47,420	16,800	.....	.....	2,620	4,420	25	7,020

*Barrels per calendar day. †Province totals include calendar-day crude capacity not reported and other calendar-day figures converted to stream-day basis. ‡Not reported.

Quebec

British American Oil Co., Ltd.:														
Montreal East	45,000	50,000	17,000	.....	[1]22,000	3,000	[6]13,000	[15]15,550	Naphtha	.....	[2]630	330	.....	9,000
Canadian Petrofina, Ltd.:														
(Montreal) Pointe-aux-Trembles	28,500	30,000	14,500	[4]3,800	[3]12,000	10,000	[5]4,500	[8]4,500 [2]4,500	Mid. dist. Naphtha	[1]1,500	[2]500	.....	80	.....
Imperial Oil, Ltd.:														
Montreal East	71,000	78,900	35,500	[2]11,900	[1]21,200	4,240	[5]10,500	[2]7,000	Naphtha	.....	[2]2,300	.....	.....	3,300
Shell Oil Co. of Canada, Ltd.:														
Montreal East	60,000	62,000	33,000	[2]7,500	[1]23,500	3,500	[1]8,000	[8]9,000	Cat. feed	[2]1,500	[2]1,200	.....	.....	6,000
Texaco Canada, Ltd.:														
Montreal East	59,000	61,950	.....	[2]14,000	[1]24,000	6,000	[1]12,000	[1]12,000 [4]10,000	Naphtha Mid. dist.	.....	[2]1,500	.....	.....	.....
Total	263,500	282,850	100,000	37,200	102,700	26,740	48,000	62,550	.....	3,000	6,130	330	80	18,300

Saskatchewan

British American Oil Co., Ltd.:														
Moose Jaw	13,500	15,000	5,500	[1]1,500 [2]2,250	[1]4,500	5,500	[6]5,400	[15]6,300	Naphtha	.....	[2]390	.....	100	1,200
Canadian Husky Oil, Ltd.:														
Moose Jaw	2,950	3,200	1,300	[2]1,300	.....	.....	[6]650	[9]1,000	Mid. dist.	.....	.....	.....	.....	900
Consumers Coop. Refineries, Ltd.:														
Regina	15,200	16,000	6,500	[3]3,000	[1]5,000	5,000	.....	.....	.....	.....	[2]500	.....	145	.....
Imperial Oil, Ltd.:														
Regina	22,500	25,000	10,700	[1]5,000	[1]9,000	5,850	.....	.....	.....	.....	[2]1,000	.....	.....	550
Northern Petroleum Corp., Ltd.:														
Kamsack	900	1,200	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....
Petroleum Fuels, Ltd.:														
Moose Jaw	1,100	1,100	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....
Royalite Hi-Way, Ltd.:														
Saskatoon	6,150	6,500	2,380	[1]1,600 [2]3,780	[1]2,600	2,600	.....	.....	.....	.....	[1]250	.....	.....	300
Royalite Oil Co., Ltd. (formerly Prince Refineries, Ltd.):														
Prince Albert	950	1,000	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	300
Total	63,250	69,000	26,380	18,430	21,100	18,950	6,050	7,300	.....	.....	2,140	.....	245	3,250

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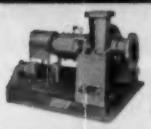
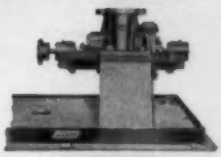
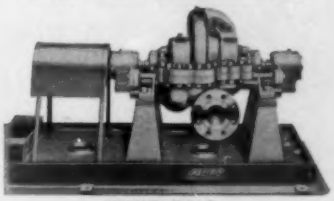


TYPE SVC
To 850°F.—25 to 3200 GPM
To 600 PSIG—To 650 DIFF. HD. FT.



TYPE HVC
To 850°F.—600 to 4500 GPM
To 600 PSIG—To 1000 DIFF. HD. FT.



TYPE RHC
To 500°F.—50 to 3000 GPM
To 700 PSIG—To 1300 DIFF. HD. FT.

TYPE AC
To 850°F.—100 to 2500 GPM
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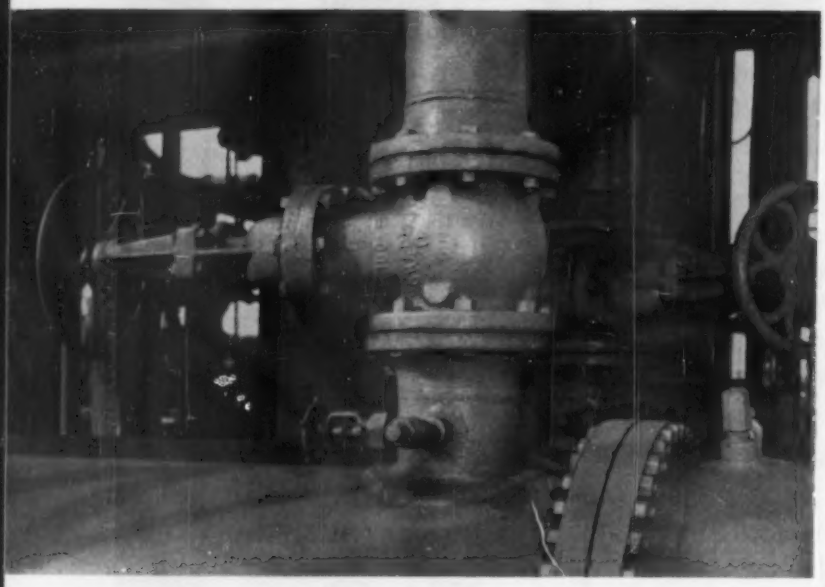
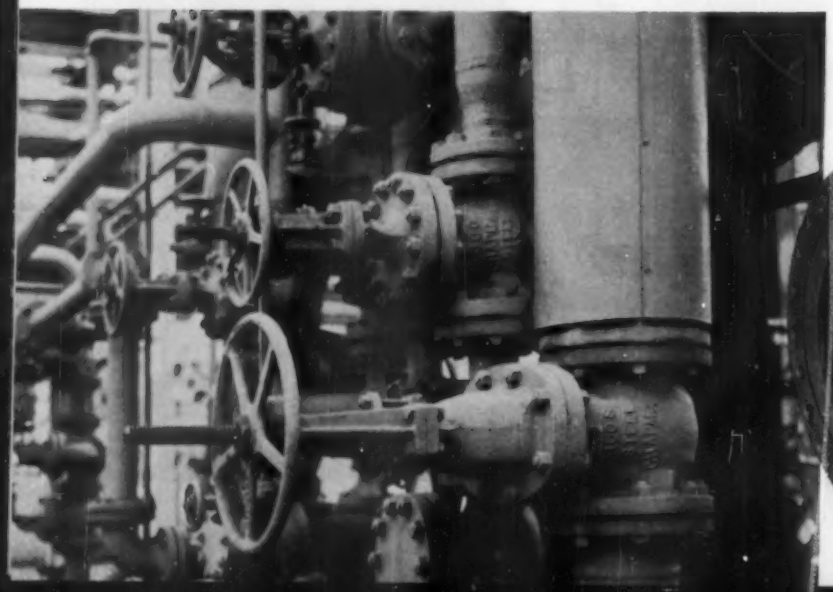
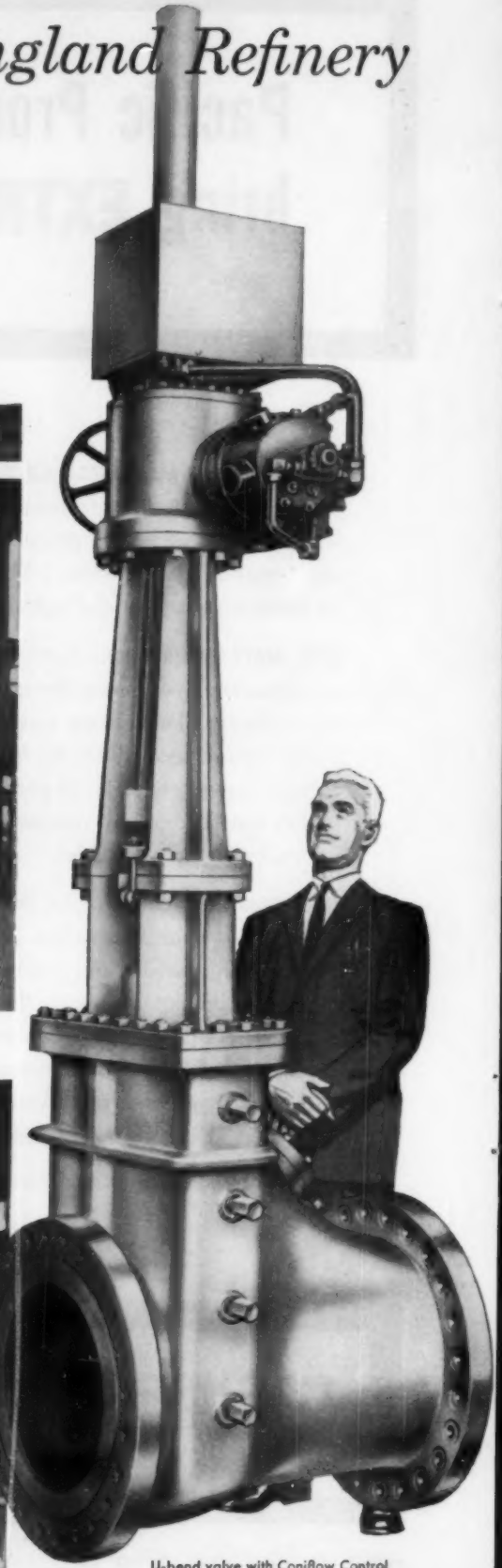
New England Refinery



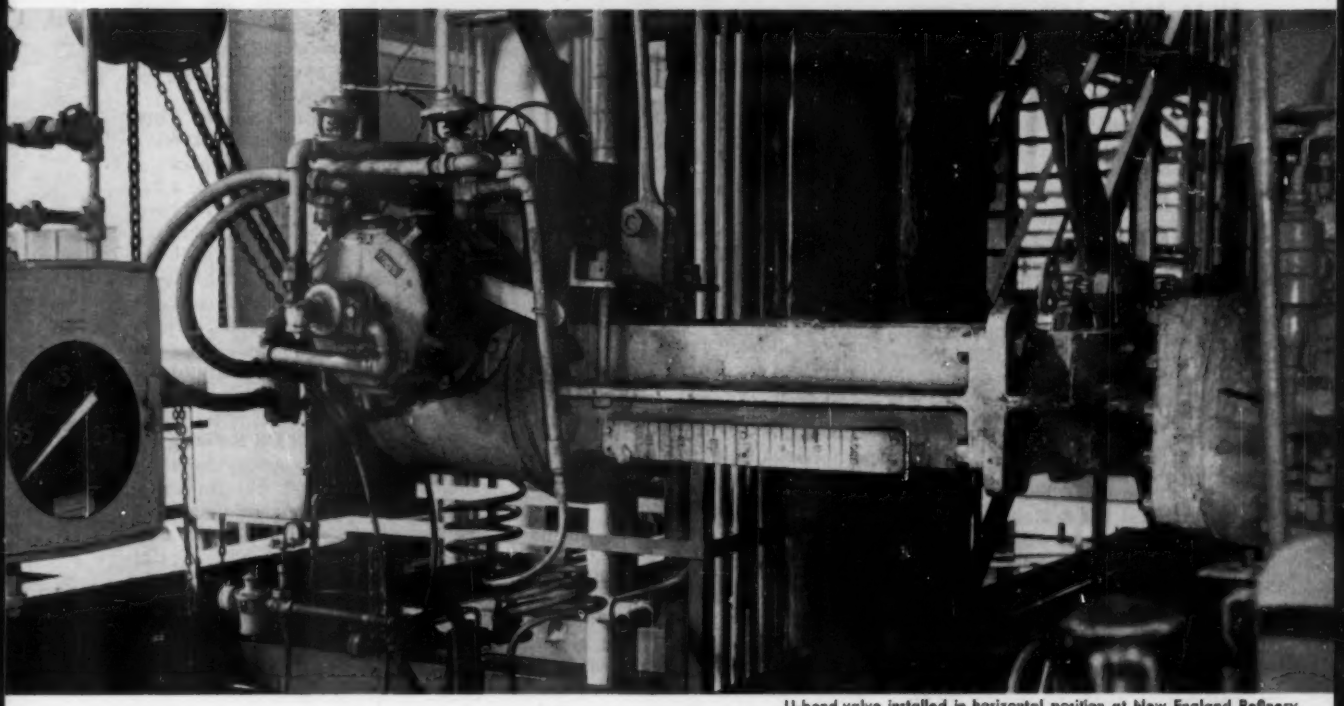
Above and below, some of many Chapman Valves giving service at New England Refinery at Everett.





U-bend valve with Coniflow Control designed and built by Chapman for catalytic cracking service.

uses **CHAPMAN VALVES**



U-bend valve installed in horizontal position at New England Refinery.

This isn't just a regional story. Far from it. In addition to the New England Refinery in Everett, Massachusetts, the Esso Standard Oil Company has other refineries at Linden, New Jersey; Bayonne, New Jersey; Baltimore, Maryland; Baton Rouge, Louisiana and Charleston, South Carolina.

These, like other leading refineries in all parts of the world, use Chapman Valves . . . both standard and special . . . *for good reasons.*

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Esso's New England Refinery is a good example of meeting these requirements. When World War II brought on an urgent demand for better and cheaper gasoline and fuel, a new method . . . catalytic cracking . . . was developed. Today, with this added miraculous giant known as a "cat cracker," built by Foster Wheeler, the New England Refinery is a still more modern plant. Tanks with a total capacity of 60,000,000 gallons can be filled with finished products. Some of this production is delivered to all of New England and to parts of New York State to meet industrial, automotive and domestic needs . . . a real, important service.

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Report on refinery construction . . .

scheduled for completion after January 1, 1959, in both the United States and Canada

A

• **Alaska-Yukon Refiners & Distributors, Ltd.,** will complete a $6,000,000, 7,500-bbl. plant at Haines, Alaska, by June 1959. It will include a 2,500-bbl. thermal cracker.

• **Allby Asphalt & Refining Co.** will add a 500-bbl. Catforming unit at Hammond, Ind.

• **American Gilsonite Co.** will increase capacity of Platformer from 1,150 bbl. to 1,300 bbl. and capacity of Unifining unit from 1,150 to 1,300 bbl. at Gilsonite, Colo., by July 1959. The units will be company-built.

• **American Petrofina Co.** of Texas will complete a 3,000-bbl. Platformer and a 1,500-bbl. hydrofluoric acid alkylation unit at Mount Pleasant, Tex., in January 1959. **J. F. Pritchard & Co.** is contractor.

• **American Oil Co.** will increase crude capacity 1,000 bbl. at Savannah, Ga., in spring 1959. Straightrun-asphalt unit will be increased from 3,800 bbl. to 4,350 bbl.

• **Ashland Oil & Refining Co.** will increase fresh-feed capacity 3,900 bbl. with recycle capacity being 3,100 bbl. on the fluid cat cracker at Catlettsburg, Ky., May 1, 1959.

• **Atlantic Refining Co.** will increase capacity of vacuum unit charging topped crude 40,000 bbl. at Philadelphia in 1959. Contractor is **Hydrocarbon Research, Inc.** A 20,000-bbl. visbreaker will be added in 1959 and fresh-feed capacity will be increased 3,200 bbl. and recycle 1,900 bbl. on the fluid cat cracker by 1960.

• **Aurora Gasoline Co.** will increase capacity of vacuum unit charging topped crude from 24,000 bbl. to 34,000 bbl. by February 1, 1959, at Detroit. **Refinery Engineering Co.** has contract.

B

• **Bay Petroleum Corp.** will increase crude capacity from 24,000 bbl. to 34,000 bbl. at Chalmette, La., by April 1, 1960. **Bechtel Corp.** is contractor. Fresh-feed capacity will be upped 3,600 bbl. and recycle 2,000 bbl. on the fluid cat cracker.

• **Bay Refining Co.** will increase crude capacity 12,000 bbl. at Bay City, Mich., in 1959. A 750-bbl. sulfuric acid alkylation unit will be added in June 1959. **Southwestern Engineering Co.** is contractor for both projects.

• **BP Canada, Ltd.,** will complete a $30,000,000 25,000-bbl. plant at Ville d'Anjou, Que., by April 1960. It will include a 15,000-bbl. vacuum unit charging topped crude, a 9,000-bbl. cat cracker, a 6,000-bbl. Platformer, a 12,000-bbl. hydrodesulfurization unit, and an 800-bbl. catalytic polymerization unit. **Lummus Co. of Canada, Ltd.,** has contract.

• **British American Oil Co., Ltd.,** will increase capacity of its fluid cat cracker 6,000 bbl. at Clarkson, Ont., in July 1959. **Canadian Kellogg Co., Ltd.,** has contract. **M. W. Kellogg Co.** will increase capacity of the catalytic hydrodesulfurization unit 8,000 bbl. in April 1959.

C

• **California Oil Co.** will increase capacity of its Platformer 10,000 bbl. at Perth Amboy, N. J., in March 1959. A 10,000-bbl. Unifiner will be added in March 1959 also. Contractor is **H. K. Ferguson.**

• **Cal-Mex Oil & Refining Co.** has let a $27,000,000 contract to **Ralph M. Parsons Co.** for a 20,000-bbl. plant near San Diego, Calif. The plant, to be completed early 1959, will include a cat cracker, cat desulfurizer, cat reformer, and a sulfur-recovery unit.

• **Canadian Husky Oil, Ltd.,** is considering plans for crude expansion at Lloydminster, Alta.

At Moose Jaw, Sask., crude and cat cracking expansions are being considered.

• **Canadian Oil Companies, Ltd.,** will increase capacity of its crude unit from 30,000 bbl. to 50,000 bbl. and capacity of vacuum unit charging topped crude from 15,000 bbl. to 25,000 bbl. by July 1959 at Corunna, Ont. **M. W. Kellogg Co.** is contractor.

• **Caribbean Refining Co.** is considering various types of added capacity at Bayamon, Puerto Rico.

• **Carter Oil Co.** will add a hydrofiner with virgin gasoline distillate feed with 11,000-bbl. capacity at Billings, Mont. A 2,300-bbl. hydrofluoric acid alkylation unit will be added also. **Refinery Engineering Co.** is contractor for both these additions to be completed by June 1, 1959.

• **Champlin Oil & Refining Co.** will increase fresh-feed capacity 1,000 bbl. on its fluid cat cracker in April 1959 at Enid, Okla.

• **Chemoil Corp.** may build a plant between New Orleans and Baton Rouge, La., with probable completion set for 1960. An alternate plan being considered is to buy an existing plant and start operation in 1959.

• **Commerce Oil Refining Corp.** plans to complete June 1, 1960, a $48,000,000, 43,000-bbl. plant at Jamestown, R. I. It will include a 21,650-bbl. vacuum unit to charge topped crude, a 44,000-bbl. fluid cat cracker (50% recycle), a 10,750-bbl. Platformer, a 10,750-bbl. Unifiner, a 2,828-bbl. sulfuric acid alkylation unit, a 1,000-bbl. catalytic polymerization unit, a 2,358-bbl. C_5+ isomerization unit, and coke capacity of 550 tons. **Fluor Corp., Ltd.,** has construction contract.

• **Commonwealth Oil Refining Co.** will increase crude capacity from 65,000 bbl. to 75,000 bbl. in spring 1959. Capacity of vacuum unit charging topped crude will be upped from 42,200 bbl. to 48,750 bbl. A Unifiner will be added with a capacity of 7,500 bbl. having cycle oil feed in March 1959. **Procon, Ltd.,** has contract. Cat cracking fresh feed will be increased 7,400 bbl. (100% recycle) in spring 1959.

• **Continental Oil Co.** will add an 11,000-bbl. cat reforming unit at Westlake, La., with completion set for early 1960. Contractor is **Bechtel Corp.**

D

• **Derby Refining Co.** will complete a 1,700-bbl. hydrofluoric acid alkylation unit May 1, 1959, at Wichita, Kans. **Procon, Inc.,** has contract.

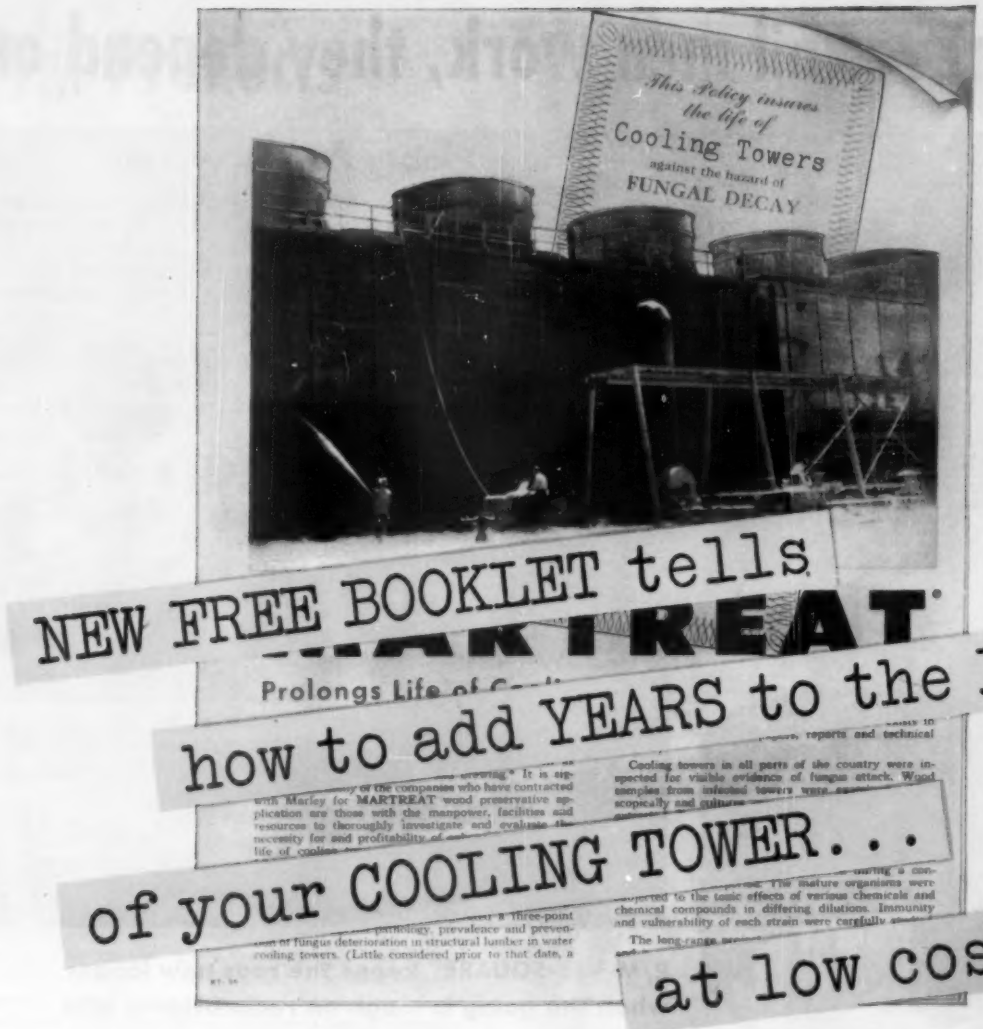
• **Esso Standard Oil Co.** is adding 810 bbl. per day to asphalt capacity at Charleston, S. C.

E

• **Excelsior Refineries, Ltd.,** will complete a 4,000-bbl. plant at The Pas, Man., early 1959. Cost will be $1,500,000.

F

• **Farmers Union Central Exchange, Inc.,** will increase crude capacity from 19,000 bbl. to 20,000 bbl.



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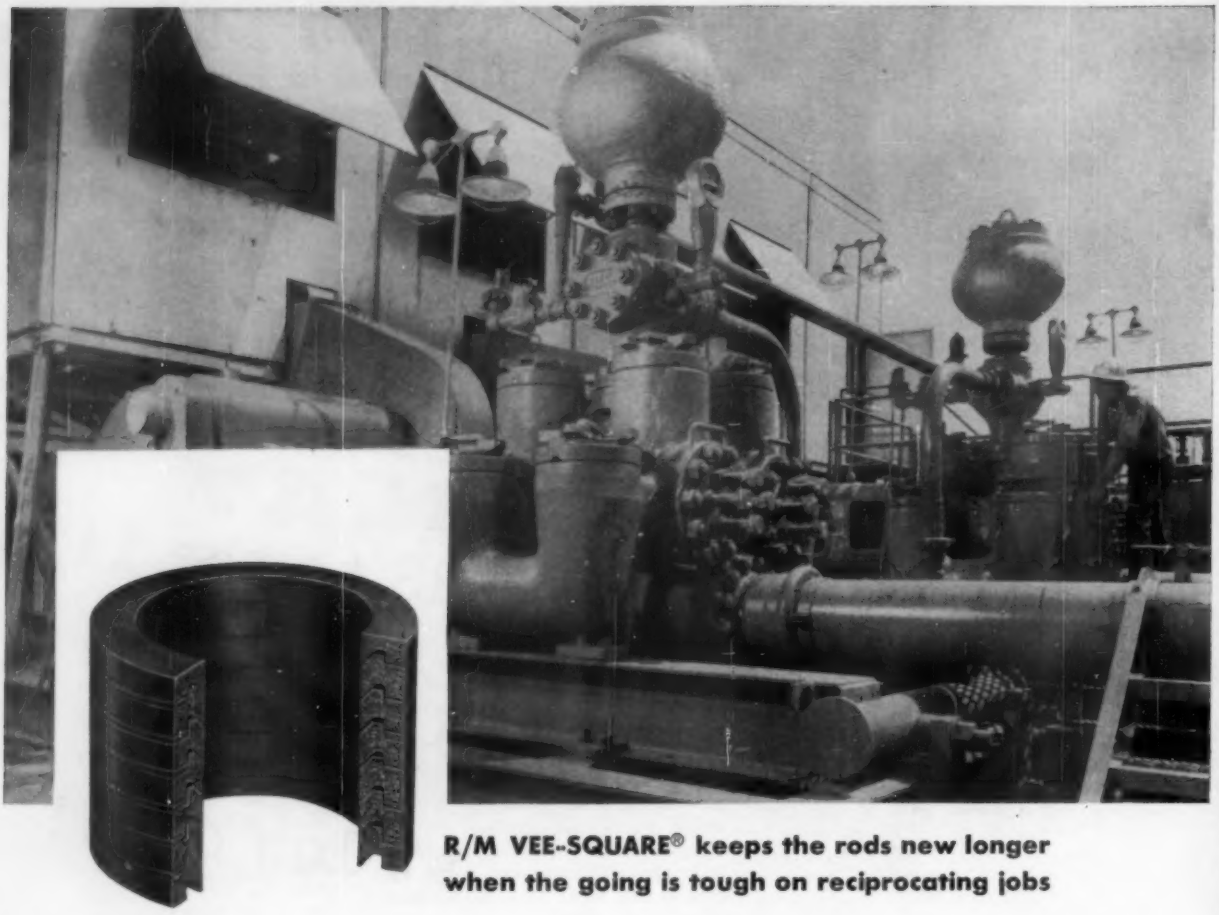

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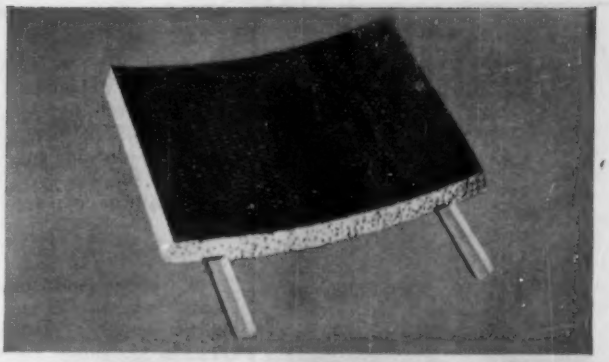

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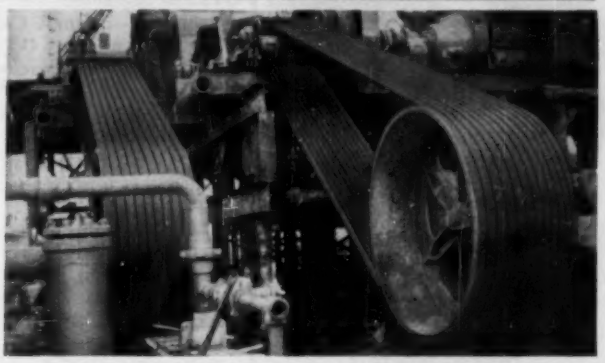

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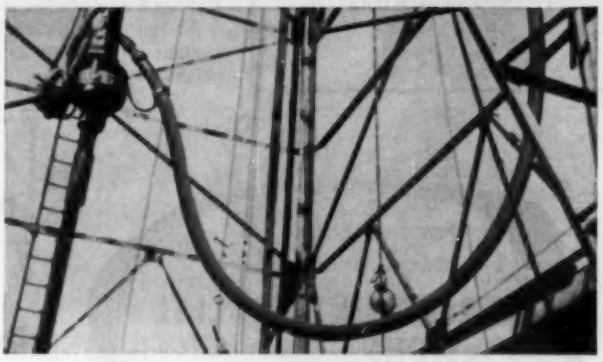

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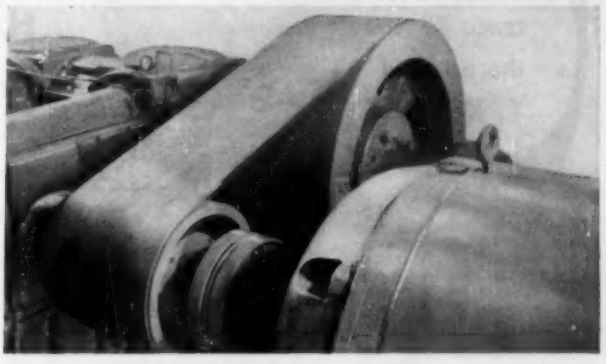

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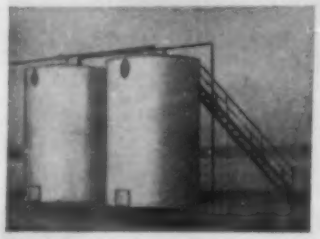

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in April 1959 at Laurel, Mont. In May 1960 a Unifiner with gasoline distillate feed having 7,100-bbl. capacity will be completed. Straight-run-basic-asphalt unit will be increased 300 bbl. in 1959. All additions will be company-built.

G

• **General Petroleum Corp.** will increase capacity of its platinum reformer from 12,000 bbl. to 20,000 bbl. in September 1959 at Torrance, Calif. **C. F. Braun & Co.** has contract.

• **Golden Bear Oil Co.** will increase lube-oil capacity from 2,000 bbl. to 2,500 bbl. at Oildale, Calif., in June 1959. Contractors are **D. G. Reynolds Co.** and own staff.

• **Great Western Producers, Inc.,** is planning to increase crude capacity at Irving, Tex., from 1,800 bbl. to 2,600 bbl. Capacity of Sinclair-Baker cat reforming unit will be increased from 1,200 bbl. to 1,500 bbl.

• **Gulf Oil Corp.** is adding an 1,800-bbl. sulfuric acid alkylation unit at Toledo in April 1959. **M. W. Kellogg Co.** is contractor.

At Port Arthur, Tex., a 4,900-bbl. pentane + isomerization unit will be added in January 1959. Capacity of the Platformer will be increased 12,000 bbl. and capacity of the hydrobon unit having reforming stock feed will be increased 12,000 bbl. in May 1959. **Procon, Inc.,** has contract.

H

• **Hess Trading & Transport, Inc.,** Sewaren, N. J., is considering addition of a catalytic cracking unit and an Udex unit.

• **Howell Refining Co.** is increasing crude capacity from 5,000 bbl. to 6,500 bbl. at Corpus Christi. Work is being done by the company itself and is scheduled for completion in January 1960.

I

• **Imperial Oil, Ltd.,** will increase crude capacity from 8,000 bbl. to 16,000 bbl. in 1959 at Calgary, Alta. A 7,000-bbl. vacuum unit charging topped crude, a 4,800-bbl. fluid cat cracker with 60% recycle, and a 3,300-bbl. Powerformer will be added in 1959. A 2,000-bbl. hydrofiner with reformer feed will be added.

At Edmonton, Alta., a 1,500-bbl. hydrofluoric acid alkylation unit will be completed in 1960, at a cost of

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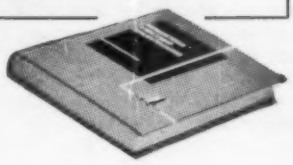

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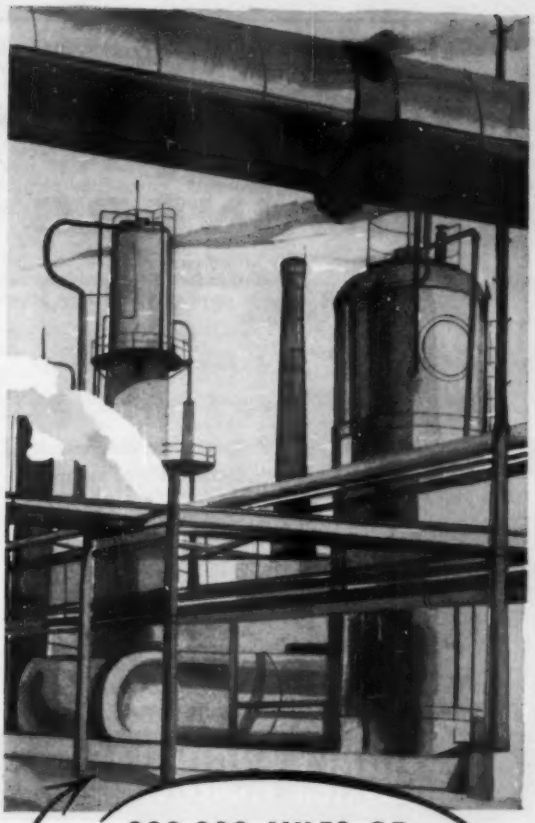

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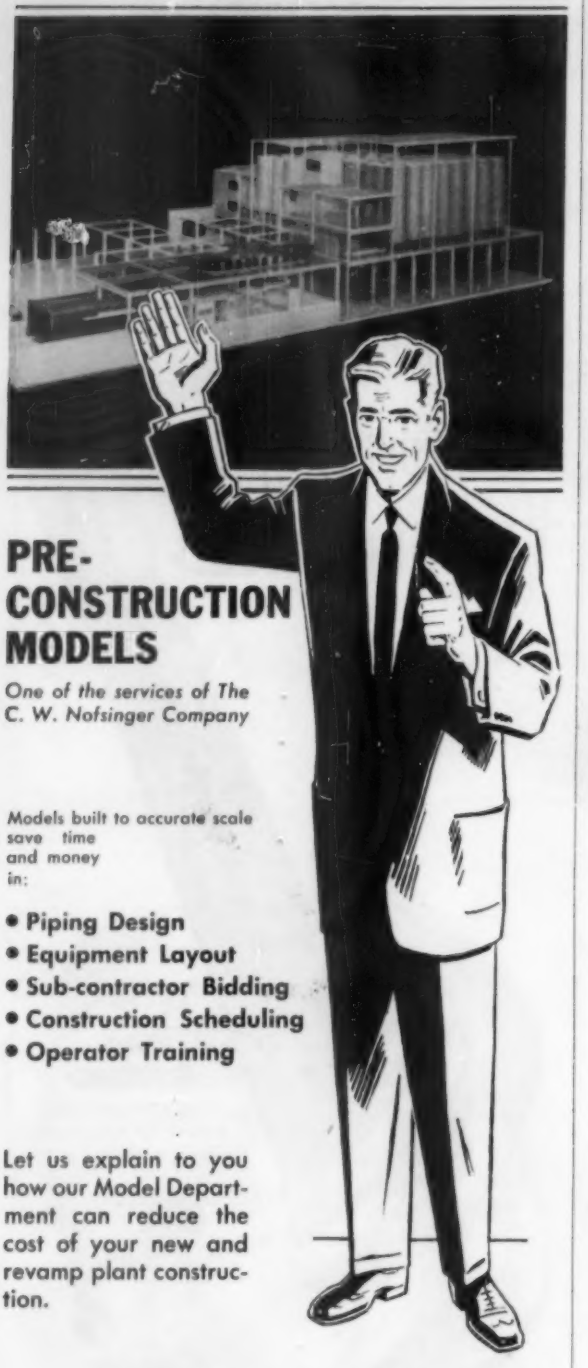

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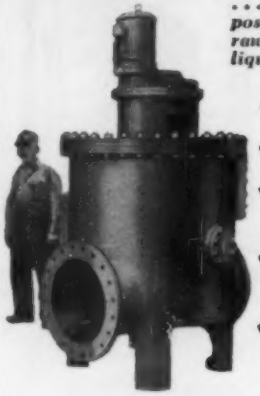

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$1,400,000. Contractor is **Foster Wheeler, Ltd.**

At Regina, Sask., a $3,000,000, 2,800-bbl. Powerformer will be added by September 1959. **Canadian Kellogg Co., Ltd.,** is contractor. A 2,000-bbl Hydrofiner having reformer feed will be completed in 1959.

At Winnipeg, Man., a $3,000,000, 740-bbl. hydrofluoric acid alkylation unit will be completed in 1959.

• **Irving Refining, Ltd.** (Irving Oil Co. and Standard Oil Co. of B. C.), will complete in 1960, a 38,000-bbl. plant at St. Johns, N. B. It will include a two-stage crude unit, a 13,000-bbl. fluid cat cracker (30% recycle), a 7,150-bbl. cat reformer, a 5,000-bbl. hydrodesulfurization unit, and a 2,500-bbl. hydrogen - treating unit. Cost will be $45,000,000 to $50,000,000. **Bechtel Corp.** is contractor.

L

• **Lion Oil Co.,** Div. Monsanto Chemical Co., is increasing capacity of vacuum unit charging topped crude from 18,400 bbl. to 19,800 bbl., fluid cat cracker unit from 5,400 bbl. to 7,864 bbl. with recycle of 855 bbl., and Thermofor unit from 6,400 bbl. to 7,670 bbl. at El Dorado, Ark., by April 1, 1960. The capacity of the Unifiner unit will be upped from 5,000 bbl. to 10,000 bbl. with No. 2 burner oil and diesel feed type by February 1, 1959. Capacity of sulfuric acid alkylation unit will be upped from 1,200 bbl. to 1,800 bbl., catalytic polymerization unit from 350 bbl. to 600 bbl., and straightrun basic asphalt from 2,700 bbl. to 2,800 bbl. by April 1, 1960.

M

• **Magnolia Petroleum Co.** will replace existing units with a 100,000-bbl. crude unit at Beaumont, Tex. Capacity of vacuum unit charging topped crude will be increased from 49,000 bbl. to 61,000 bbl. **Foster Wheeler, Ltd.,** has contract for both projects to be completed in March 1959. In January 1960 fresh-feed capacity of the cat cracker will be increased from 24,000 bbl. to 44,000 bbl. and catalytic hydrodesulfurization unit will have capacity upped from 54,000 bbl. to 74,000 bbl. **Fluor Corp.** is contractor.

• **Marvel Refining Co.** is planning a 2,000-bbl. increase for its crude unit at Grand Rapids, Mich.

• **Midland Cooperatives, Inc.,** is building a $600,000 lube plant at Fridley, Minn.

• **Mobil Oil Co., Inc.,** is building a crude unit with 28,500-bbl. capacity at Buffalo, N. Y., with comple-

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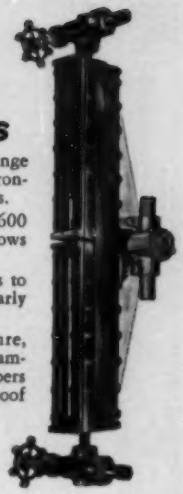

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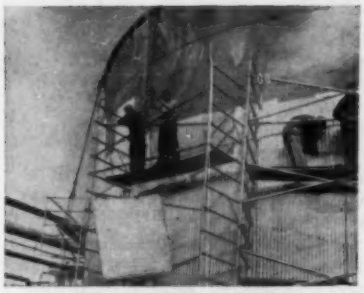

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tion scheduled for March 1959. **Lummus Co.** is contractor.

At Paulsboro, N. J., **Lummus Co.** is constructing a 17,000-bbl. delayed coker to be completed in the first quarter of 1959.

N

• **Naph-Sol Refining Co.** is planning a 6,000-bbl. vacuum unit charging topped crude at Muskegon, Mich.

• **North American Petroleum Corp.** bought site for a proposed plant at at Corpus Christi, Tex., and construction is in planning stages.

P

• **Pacific Supply Cooperative** has bought site for a proposed plant at Vancouver, Wash.

• **Petroleum Specialties, Inc.,** will add a 2,500-bbl. vacuum unit charging topped crude at Flat Rock, Mich., by June 1959. In March 1959 a 1,000-bbl. Unifiner with naptha feed will be completed. Both are to be company-built. A 900-bbl. straightrun basic asphalt unit is being built also.

• **Phillips Petroleum Co.** will complete a 6,000-bbl. hydrofluoric acid alkylation unit late 1959 at Kansas City, Kans.

R

• **R. I. Oil & Refining Co., Inc.,** plans a plant at Tiverton, R. I.

• **Richfield Oil Corp.** plans a $50,000,000 plant at Everett, Wash., with probable completion set for 1965.

At Wilmington, Calif., a 37,200-bbl crude topping unit is slated for completion mid-1959.

• **Rothschild Oil Co.** is adding an 8,000-bbl. cat cracker at Santa Fe Springs, Calif., at a cost of $2,000,000. **C. F. Braun & Co.** is contractor. Platforming capacity will be increased 1,500 bbl.

• **Royalite Oil Co., Ltd.,** will complete in 1960, a $50,000,000, 20,000-bbl. separation plant to process Athabasca oil sands at Mildred Lake, Alta. **Caribou Engineering Co.** has contract.

S

• **Shell Oil Co.** will increase capacity at Wood River, Ill., from 184,000 bbl. to 195,000 bbl. by September 1959. It will be done by the company. In June 1959 the capacity for the hydrotreating unit on middle-distillate feed will be increased from 34,000 bbl. to 59,000 bbl. **Procon, Ltd.,** is contractor. Capacity for lube oils will be upped from 3,250 bbl. to 5,100 bbl. Contractor is **Lummus Co.**

• **Shell Oil Co. of California, Ltd.,** will complete a 20,000-bbl. plant at Bronte, Ont., near Toronto, in 1960.

• **Sinclair Refining Co.** will com-

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plete a 5,000-bbl. sulfuric acid alkylation unit in 1959 at East Chicago, Ill.

• **Skelly Oil Co.** will up capacity of vacuum unit charging topped crude from 12,000 bbl. to 24,000 bbl. by February 1959 at El Dorado, Kans. It will be done by Skelly. An 8,500-bbl. coking unit will be completed in June 1959. Contractor is **M. W. Kellogg Co.** Capacity of the Platformer will be increased from 5,000 bbl. to 15,000 bbl. and a 10,000-bbl. Unifiner for reformer feed will be added. Both projects are scheduled for completion by Skelly in summer 1959. A 500-ton coke unit will be completed in June 1959 by **M. W. Kellogg Co.**

• **Southland Co.** has bought site at Black Point, Fla., for a proposed $8,000,000, 15,000-bbl. plant.

• **Southeastern Refineries, Inc.,** plans a 5,000-bbl. plant at Savannah, Ga., to make asphalt from heavy imported crude. Cost is estimated at $1,900,000.

• **Standard Oil Co. of Calif.** will build a $40,000,000, 35,000-bbl. plant at Barbers Point, Oahu Island, Hawaii, by late 1960 or early 1961. **Hawaiin Dredging & Construction Co.** and **Bechtel Corp.** have contracts for process equipment.

A $75,000,000, 60,000-bbl. plant will be built at Mukilteo, a suburb of Everett, Wash.

At Richmond, Calif., **Fluor Corp.** will increase crude capacity 30,000 bbl. by mid-1959. They will complete a 40,000-bbl. fluid cat cracker with 15,000-bbl. recycle capacity, a 4,500-bbl. sulfuric acid alkylation unit, and a 2,000-bbl. C_4 isomerization unit by mid-1959.

• **Standard Oil Co. (Ind.)** will increase crude capacity from 53,500 bbl. to 67,500 bbl. at Wood River, Ill. This new crude unit will replace older units and be the only crude distillation unit operating in the refinery. The capacity of the vacuum unit charging topped crude will be upped from 6,000 bbl. to 18,970 bbl. Both of these projects are under contract to **Arthur G. McKee & Co.** and are to be completed in March 1959. Fluid cat cracker fresh feed capacity will be increased from 18,000 bbl. to 30,000 bbl. with recycle capacity increasing from 1,000 bbl. to 21,000 bbl. **Arthur G. McKee & Co.** has the contract for this project also. In July 1959 straightrun-basic-asphalt capacity will be upped from 3,300 to 8,000 bbl. by the company.

At Whiting, Ind., **Arthur G. McKee & Co.** will complete by May 1959 a 140,000-bbl. crude unit, the world's largest, to replace several smaller units. Capacity of the vacuum unit charging topped crude will be increased 51,800 bbl. by May 1959 by **Arthur G. McKee & Co.** a[illegible] a 36,000-bbl. unit will be completed by late 1959 by company forces. Capacity of the fluid cat cracker will be increased from 70,000 bbl. to 80,000 bbl. by 1960.

• **Sunshine State Refineries, Ltd.,** plans to complete late 1959 or early 1960 a 25,000-bbl. plant at Plant City, Fla. The final design and various capacities and processes are not yet determined.

• **Suntide Refining Co.** has contracted with **Refinery Engineering Co.** to build a delayed coking unit with a 7,000-bbl. capacity at Corpus Christi, Tex. Completion is due January 1, 1960.

T

• **Texas American Asphalt Co.** will build two asphalt plants at Ennis and La Coste, Tex.

• **The Texas Co.** will increase capacity of the Platformer from 13,500 bbl. to 24,000 bbl. at Lawrenceville, Ill. A hydrotreating unit will be completed having straightrun naphtha feed with capacity of 10,500 bbl. **Bechtel Corp.** has contract for both these projects to be completed October 1, 1959.

At West Tulsa, Okla., an 1,800-bbl. sulfuric acid alkylation unit and a 500-bbl. C_4 produced isomerization unit will be completed January 1, 1960.

At Port Arthur, Tex., capacity of the Platformer will be increased from 40,000 bbl. to 60,000 bbl. by June 1, 1959. Capacity of the Unifiner having straightrun gasoline feed will be increased from 40,000 bbl. to 60,000 bbl. Both these projects, to be completed June 1, 1959, are under contract to **Fluor Corp.**

A sulfuric acid alkylation unit with 1,600-bbl. capacity will be completed by January 1, 1960, at El Paso, Tex.

• **Texas Gas Corp.** will increase Platformer capacity from 2,500 bbl. to 3,000 bbl. at Winnie, Tex.

U

• **Union Oil Co. of California** is rebuilding 2,600 bbl. of new capacity for asphalt at the Oleum refinery at Rodeo, Calif. This will be completed by April 1, 1959.

• **Utah Oil Refining Co.** will complete a 1,000-bbl. C_4 isomerization unit by April 15, 1959. It's being company-built.

V

• **Vickers Petroleum Co., Inc.,** is

studying plans for expansion of catalytic polymerization at Potwin, Kans.

W

• **Wainright Producers & Refiners, Ltd.,** is increasing crude capacity from 4,000 bbl. to 5,000 bbl. by April 1959 at Wainwright, Alta. This is being done by the company. **Litwin Engineering** is increasing capacity of vacuum unit charging topped crude from 1,500 bbl. to 4,000 bbl. by February 1959.

Plants not charging whole crude

ASPHALT

Byerlite Corp., Heath, Ohio: 2,000 bbl. per day of straightrun; 5,200 bbl. per day of oxidized.

Lunday-Thagard Oil Co., South Gate, Calif.; 1,700 bbl. per day of oxidized.

Monarch Refineries, Inc., Oklahoma City: 2,500 bbl. per day of oxidized.

Pabco Building Materials Division, Fiberboard Paper Products Corp., Emeryville, Calif.: 3,000 bbl. per day of oxidized. At Portland, Ore.: 525 bbl. per day of oxidized.

LUBES AND WAXES

Bareco Wax Co., div. of Petrolite Corp., Kilgore, Tex.: 750 bbl. per day charge capacity for tank bottoms and selected petroleum fractions.

Calumet Refining Co., Burnham, Ill.; 750 bbl. per day of lube oil. Crude unit, 1,200 bbl. per day capacity is shut down.

Cit-Con Oil Corp., Lake Charles, La.: charges 28,750 bbl. per day of petroleum fractions, finished lube capacity 10,000 bbl. per day.

Dallawax Co., Kilgore, Tex.: 500 bbl. per day wax from tank bottoms.

Ultra-Penn Refining Co., Bruin, Pa.: 100 bbl. per day lube oil.

OTHER

American Gilsonite Co., Gilsonite, Colo.: charges gilsonite, delayed coking 4,500 bbl. per day; Platforming 1,150 bbl. per day, Unifining 1,150 bbl. per day. Coke capacity 300 tons per day.

Calstate Refining Co., Long Beach, Calif.: charges petroleum fractions to 2,500-bbl. per day visbreaker, 1,000 bbl. per day Hyperforming unit which is shut down.

Kerr-McGee Oil Industries, Inc., Cleveland, Okla.: 2,400 bbl. per day Platforming.

Pacific Petroleums, Ltd., Taylor,

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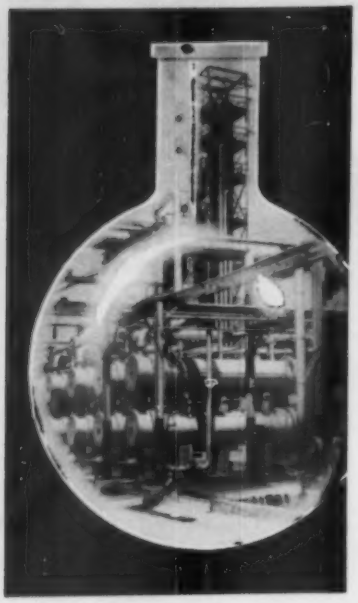

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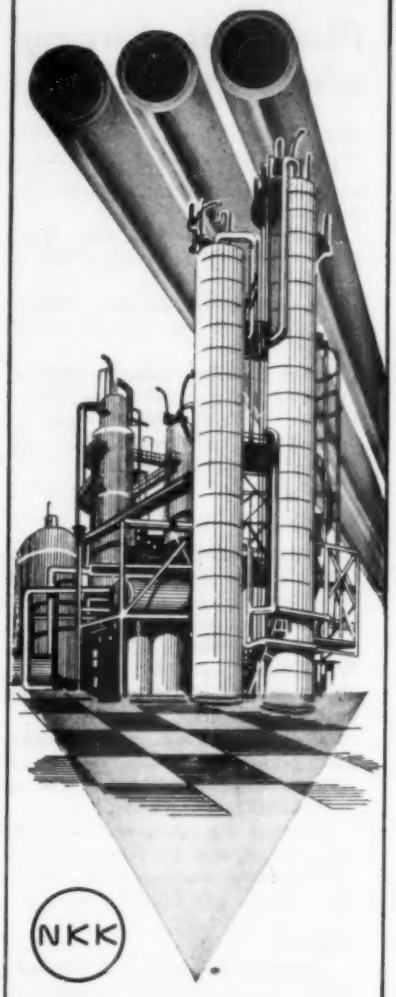
B. C.; condensate 4,000 bbl. per day, Platforming 2,000 bbl. per day, Unifining 3,250 bbl. per day.

Shutdown plants in U. S. and Canada

Company and location—	Cap., bbl. per stream day
Alberta	
Bonnyville Oil & Refining Corp., Bonnyville	1,000
California	
Fletcher Oil Co., Wilmington	9,000
Manespo Refining Co., Long Beach	4,000
Signal Oil & Gas Co., Signal Hill (formerly Hancock)	21,000
West Coast Asphalt Sales Co., Bakersfield	8,800
Kentucky	
Aetna Oil Co., Div. Ashland Oil & Refining Co., Louisville	11,000
Louisiana	
American Oil Co., Destrehan (being dismantled)	37,500
Clark Oil & Refining Corp., Marrero	7,000
Mississippi	
Paluxy Asphalt Co., Yazoo City	5,600
Montana	
Jet Fuel Refinery, Mosby	600
Texas Calgary Co., Lodge Grass	1,425
Nebraska	
Searle Petroleum Co., Salem	1,000
New Mexico	
El Paso Natural Gas Products Co., Brickland	4,200
El Paso Natural Gas Products Co., Prewitt	5,000
Ohio	
National Refining Co., Div. Ashland Oil & Refining Co., Findlay	16,000
Western Reserve Refining Co., Div. Ashland Oil & Refining Co., Niles	6,000
Oklahoma	
Mercury Oil Refining Co., Oklahoma City	5,250
Wilcox Oil Co., Bristow	5,300
Saskatchewan	
Royalite Coil Co., Ltd., Coleville	5,000
Texas	
Cosden Petroleum Corp., Hawley	6,500
Gladewater Refining Co., Gladewater	2,500
Phoenix Refining Co., San Antonio	3,500
Sid Richardson Refining Co., Texas City	18,000
Utah	
Uinta Oil Refining Co., Jensen (to be dismantled)	1,700
Wyoming	
Big D Oil Co., Sundance	125
Big Horn Refining Co., Lovell	6,500
Continental Oil Co., Glenrock	4,100
Pilot Oil Co., Morton	200

Pipe & Tube
For Oil & Gas Industries



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another
TRETOLITE SERVICE
report

THESE USE-PROVEN PRODUCTS CUT MANUFACTURING AND MAINTENANCE COSTS

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TRET-O-LITE Demulsifying Chemicals separate an aqueous phase from a hydrocarbon phase, or vice versa.

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TRET-O-LITE Demulsifiers are used to treat tank "bottoms," also Bunker "C" fuels for the removal of salts and trace metals to permit the use of such fuels in gas turbines.

TRET-O-LITE* *Chemical Desalting*

TRET-O-LITE Chemical Desalting removes harmful salts from crude oil in the 95% to 100% efficiency range, and is currently being used to process over 1½ million barrels of crude daily. Chemical costs average 1.3 mills per barrel.

Experienced Tretolite refinery service engineers inspect construction, supervise start-up and make periodic inspections of the Tretolite desalting equipment. It can be purchased, rented, rented with option to purchase, or constructed by the refiner according to plans furnished by Tretolite.

KONTOL* *Corrosion Inhibitor*

KONTOL Corrosion Inhibitor is a liquid organic semi-polar compound, available in various formulas. It adsorbs onto metal surfaces to form impervious corrosion-inhibiting film. KONTOL Corrosion Inhibitors prevent corrosion in hydrocarbon distillation systems by protecting against attack by chlorides, sulfides, organic acids, other corrosive agents and hydrogen blistering. They also have effective detergent properties at temperatures above those considered normal for this type of inhibitor.

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KUPLEX* *Metal Deactivator*

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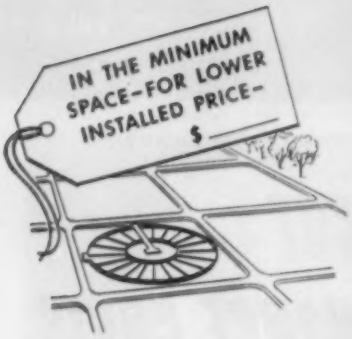

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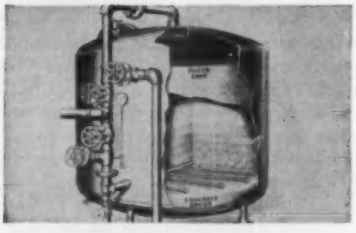

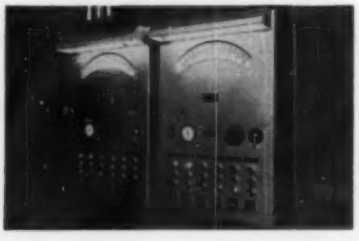

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Cost of crude-oil desalting

BY W. L. NELSON
Technical Editor and
Petroleum Consultant

THE DIRECT COST of desalting by either the electrical or chemical methods is much the same although indirect benefits by the more dependable electrical method may result in significant savings. The cost of steam for heating the water used in desalting is more frequently the largest single cost item, but the many cost elements shown in Table 1 must be considered. Plant size and amount of salt in the crude oil are major variables as indicated in Table 2.

A high-salt-content oil needs more water to dilute the brine, and the water must be heated. Thus utility requirements are somewhat a function of salt content as shown in Table 3. Waterman and Moechel (Pet. Engineer, Oct. 1957, p. C-20) present the data of Table 4.

TABLE 2—APPROXIMATE 1956 COSTS OF DESALTING, CENTS PER BARREL.

	2,000 BPD	10,000 BPD	30,000 BPD	100,000 BPD
Labor, maint., and cleaning	0.247	0.106	0.145	0.08
Water and steam:				
for 100 lb. salt/1,000 bbl.	0.054-0.215	(same at all capacities)		
for 500 lb. salt/1,000 bbl.	0.270-1.077	(same at all capacities)		
Chemicals	0.030-0.246	(same at all capacities)		
Royalty and elect. power (if any)	0 -0.058	(same at all capacities)		
Total direct cost—100 lb./M. bbl.	0.38 -0.64	0.22-0.63	0.27-0.57	0.19-0.51
Total direct cost—500 lb./M. bbl.	0.65 -1.37	0.49-1.36	0.53-1.30	0.46-1.24
Laboratory control	0.156	0.031	0.031	0.009
Obsolescence (½%)	0.023	0.012	0.008	0.005
Insurance and taxes (2%)	0.090	0.048	0.031	0.020
Interest or dividends (4%)	0.180	0.096	0.063	0.039
Other indirect charges	0.45	0.19	0.13	0.07

TABLE 3—EFFECT OF SALT ON UTILITY REQUIREMENTS

Pounds salt per 1,000 bbl. (lb./M.bbl.)	Water required: % of crude	Water required: gallons per bbl.	Water required: pounds per bbl.	Steam required 10⁶ B.t.u. or pounds per bbl.
1,000	20-50	8 -21	70-175	10-25
500	10-25	4 -11	35-87	5-13
200	4-10	1.7- 4	14-35	2- 5
100	2- 5	0.8- 2	7-18	1- 3
20	1	0.4	4	0.5

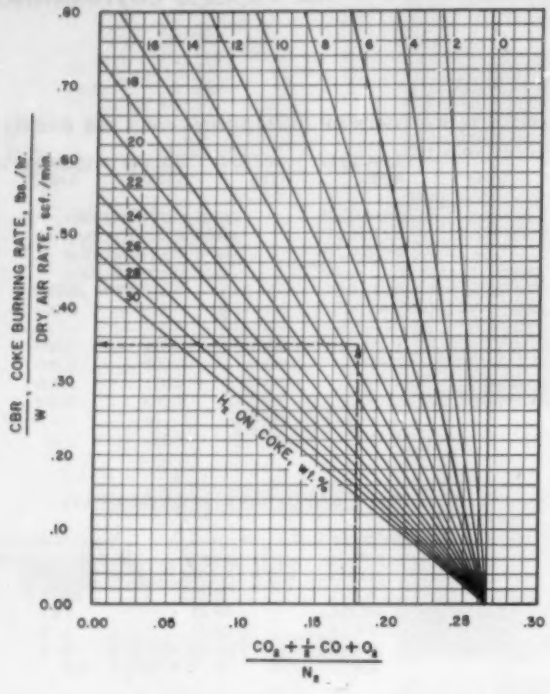
TABLE 4—REPRESENTATIVE CHEMICAL DESALTING PLANTS

Crude type	Salt, (lb./M. bbl.)	Water, (%)	Chemical, (cts./bbl.)
Willimar, Arabian, Refugio, Oficina	40	5.0	0.12
Redwater mix	50	5.0	0.10
Mid-Continent mix	29	4.5	0.10
Mississippi mix, Bachaquero	220	5.0	0.40
Leduc, Bottineau, slop oil	45	4.5	0.25
Kansas mix	28	10.0	0.15
West Texas, Mid-Continent, West Kansas	32	3.2	0.10
East and West Texas	40	3.5	0.10
Hawkins, Mississippi, and Arkansas	32	4.7	0.14
West Texas and Wyoming	20	5.0	0.11
South Texas	60	5.0	0.06

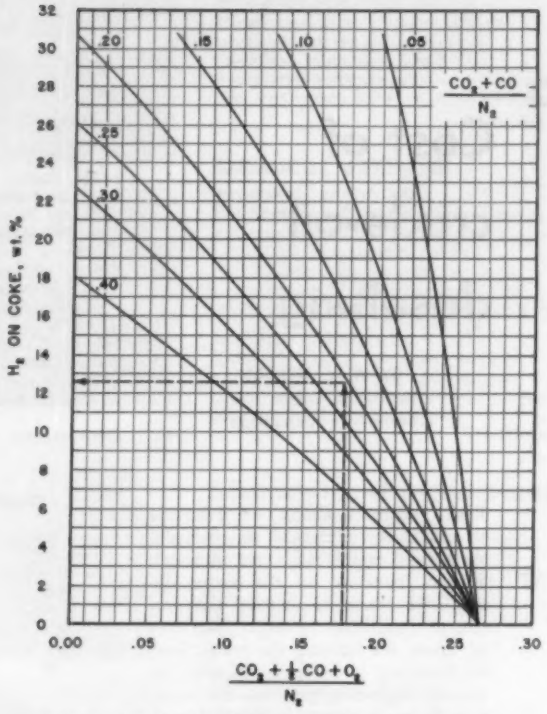
TABLE 1—ELEMENTS OF THE COST OF DESALTING

Element	Unit (somewhat standard)	1956 unit cost	For 30,000 B/D plants, cents per. bbl.	Process costimating references
Labor	0.03-0.4 men/8-hr. shift	$3.12 per hour*	0.075	26, 28, 41
Maintenance and cleaning	3-5% of replacement cost	$3.58 to $16.50 50/bbl.†	0 to 0.025	..
Royalty, if any		zero to 0.10 ct./bbl.		
Electricity, if used	20-30 kw.-hr./bbl.	0.8-1.1 ct./kwh	0 to 0.033	13, 14
Treated water:				
100 lb./M. bbl. salt	2- 5% of crude‡	10-30 ct./1,000 gal.	0.008-0.063	
500 lb./M. bbl. salt	10-25% of crude‡	10-30 ct./1,000 gal.	(0.042-0.315)	16
Steam (heat):				
100 lb./M. bbl. salt	1-2.5 lb./bbl.	45-60 ct./1,000 lb.	0.046-0.152	
500 lb./M. bbl. salt	5-13 lb./bbl.	45-60 ct./1,000 lb.	(0.228-0.762)	17, 18
Chemicals:				
Caustic	0.5-1.5 lb./M. bbl.	4.15 ct./lb.§	0 to 0.006	..
Demulsifier	0.2-0.8 gal./M. bbl.	$1.50-$3.00/gal.	0.030-0.240	..
	Total direct costs—	100 lb. salt	0.27 -0.57¶	..
	Total direct costs—	500 lb. salt	0.53 -1.30¶	..
	Total direct costs—	literature	0.07 -0.55	..

*Including only 15% for burdens because average wage already accounts for some off-time. †Costimating No. 26, Over-all Plant Costs, The Oil and Gas Journal, Mar. 11, 1957. ‡Refiners Notebook No. 30, Crude Oil Settlers, The Oil and Gas Journal, Feb. 17, 1945, p. 121. §Spent caustic at little cost can sometimes be used. ¶Other indirect charges may amount to 0.133 ct./bbl.



HYDROGEN on coke from flue-gas orsat. Fig. 1.



COKE—AIR RATIO from flue-gas orsat. Fig. 2.

Here's a graphical method for

Obtaining FCC regenerator data

TWO IMPORTANT VARIABLES in the operation of catalytic cracking units are the amount of hydrogen on coke and the coke-burning rate (CBR). The former, usually expressed as weight per cent of total coke burned in the unit, is a measure of catalyst-stripper performance. The latter, expressed in pounds per hour, is primarily useful for calculating catalyst-circulation rate and as a guide to changes in feed composition and unit performance.

Both of these variables may be calculated from the measured total air rate to the regenerator and an Orsat analysis of regenerator stock gas, as follows: The flue-gas rate is obtained by a nitrogen material balance around the regenerator. The hydrogen calculation is then based on the difference between oxygen entering in regeneration air and the total combined and uncombined oxygen accounted for in the flue gas, as determined by the Orsat analysis.

This difference is assumed to be the oxygen which combined with hydrogen absorbed on the spent catalyst to form water. Hydrogen on coke determined by this method is usually referred to as having been calculated by "oxygen disappearance." Carbon-burning rate is then determined directly from the measure CO_2 and CO content of the flue gas. The coke-burning rate is calculated by adding the carbon-burning rate to the previously calculated hydrogen-burning rate.

The calculations required to determine hydrogen on coke and coke-burning rate, while not difficult, are time consuming. A quicker and more convenient way of obtaining these variables is through the use of the accompanying graphs, which are simplifications of the basic material-balance calculations.

Regenerator Data

Total Dry* Air Rate to Regenerator = 24,100 s.c.f.m.

Flue Gas Orsat, vol. %
CO_2 = 12.0
CO = 5.1
O_2 = 0.1
N_2 = 82.8 (by difference)

BY J. J. BLAZEK
Technical Service Representative
Davison Chemical Division,
W. R. Grace & Co., Baltimore

Fig. 1 (dashed line)

$$\frac{CO_2 + \frac{1}{2}CO + O_2}{N_2} = \frac{12.0 + 2.55 + 0.1}{82.8}$$

$$= \frac{14.65}{82.8} = 0.177 \text{ (abscissa)}$$

$$\frac{CO_2 + CO}{N_2} = \frac{12.0 + 5.1}{82.8} = \frac{17.1}{82.8}$$

= 0.206 (parameter)

H_2 on coke = 12.6 wt. %

Fig. 2 (dashed line)

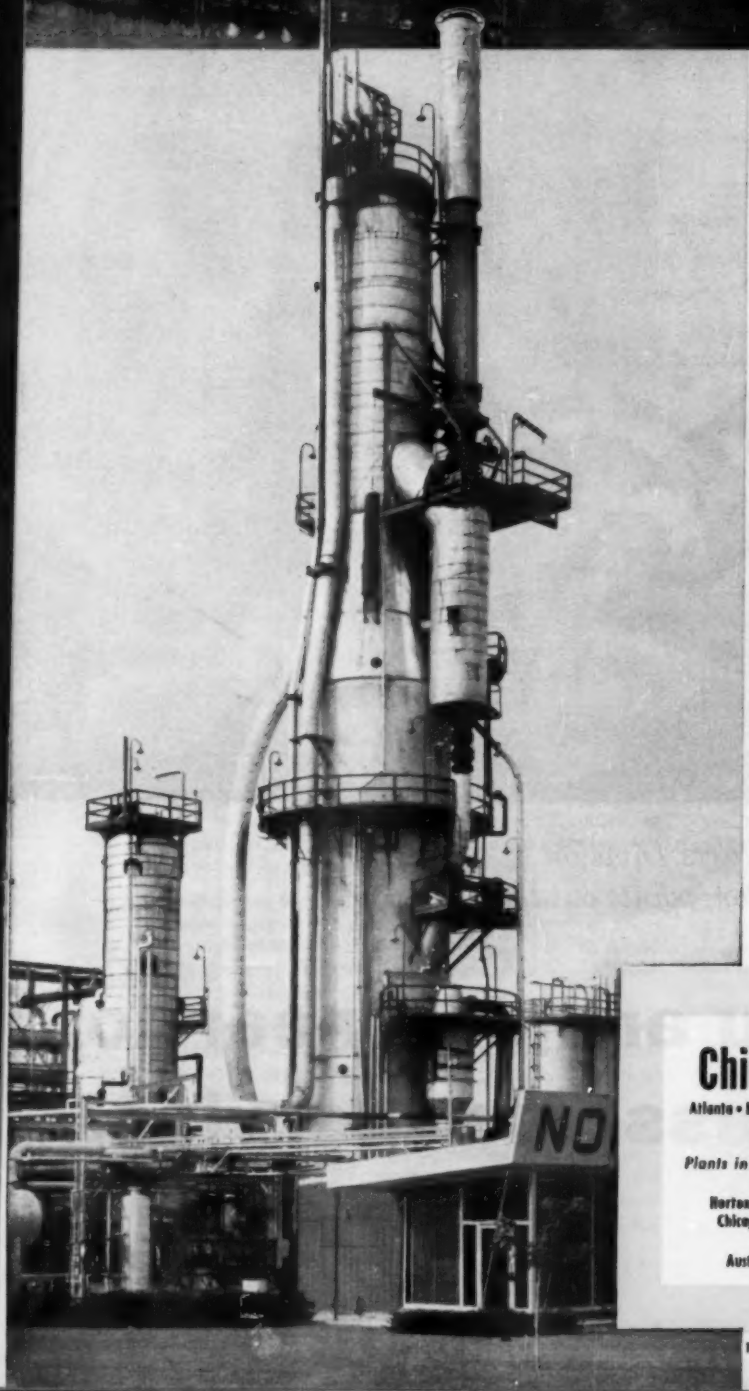
$$\frac{CBR}{W} = .35 = \frac{CBR}{24{,}100}$$

CBR = 8435 lb. per hour

*If the blower air is very humid, total air rate must be corrected to a dry basis.

20 CB&I STRUCTURES

serve refinery expansion at Twin Cities



CB&I tanks and towers keep pace with NORTHWESTERN growth

Over the past 10 years CB&I has built storage tanks for nearly 900,000 barrels of crude oil and petroleum products for the fast-growing Northwestern Refining Co. of St. Paul Park, Minnesota. CB&I also built the reactor-regenerator for the refinery's modern UOP cracking unit, shown at left.

Long-term CB&I customers can plan refinery expansion with confidence that CB&I-built structures will meet their continuing demand for progress and perfection. A single responsibility for engineering, fabrication, metallurgical and erection detail—*CB&I craftsmanship in steel*—means that CB&I storage and processing structures provide greater efficiency and maximum service life.

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Top: CB&I-built storage tanks at Northwestern include 80,000 bbl. Horton® Floating Roof crude oil tanks and jet fuel storage tanks.

Left: UOP Cat Cracker at Northwestern includes CB&I-built 10-ft. diam. reactor, 16½-ft. diam. regenerator.

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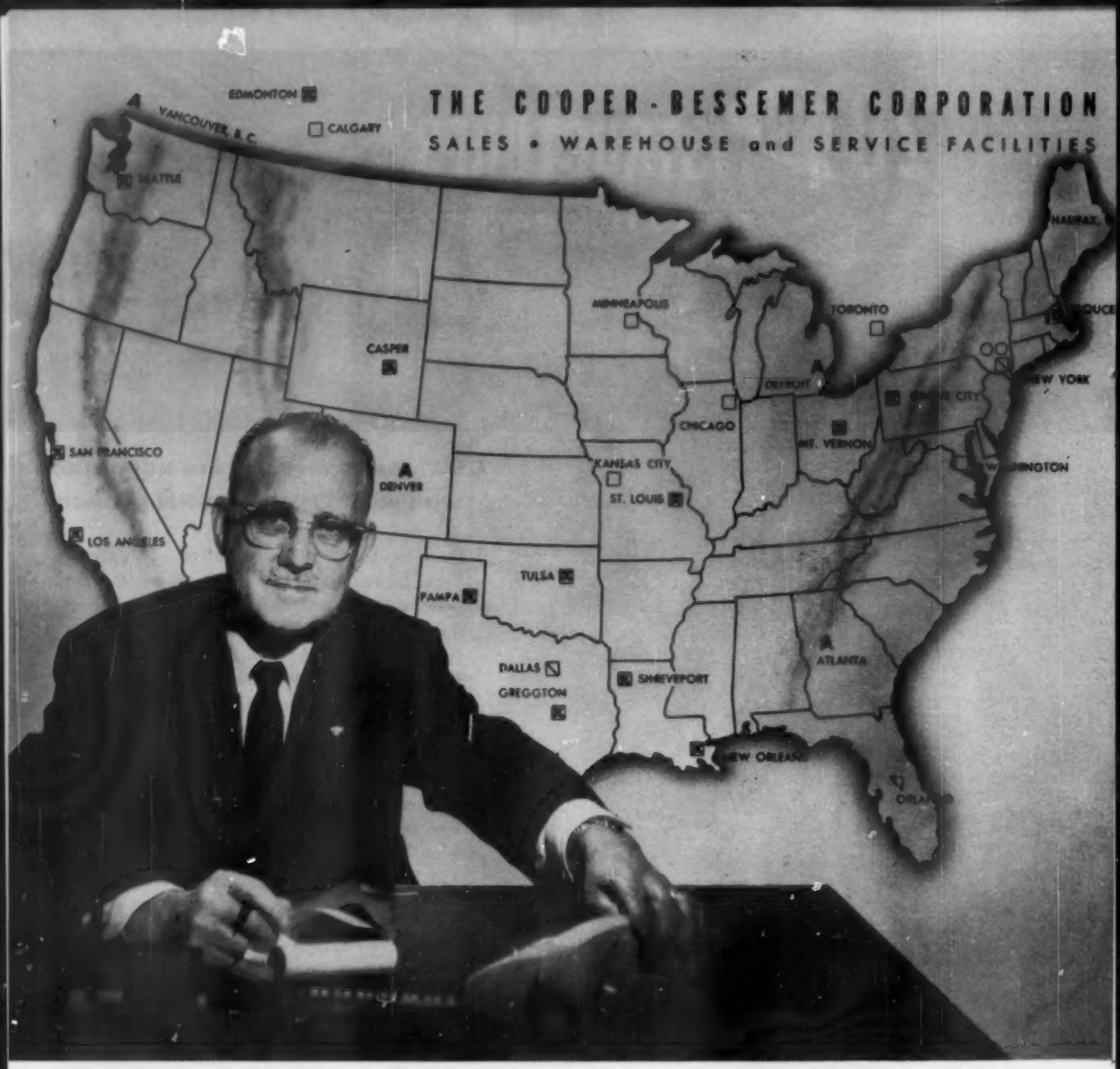

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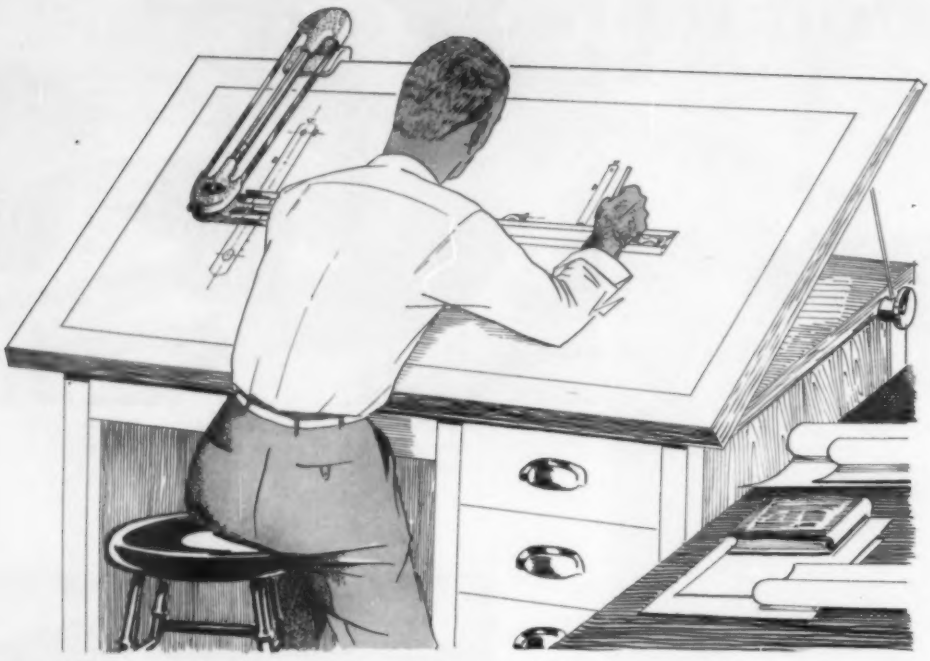


Layout problems are complex, but a few practical rules can help in . . .

Process engineering and plant design

BY D. J. ORIOLO
Catalytic Construction Co., Philadelphia

PROCESS ENGINEERING is concerned with those activities involving the development and evaluation of processes and the basic design, engineering, and startup of processing plants.

Process development covers preliminary experimental studies to check the commercial feasibility of processes, followed by bench-scale and/or pilot-plant investigations to secure information for the design of full-scale, commercial plants.[1]

Process evaluation covers both an engineering and economic assessment of process plants, starting generally before laboratory work is initiated and continuing through the process-development program and through various aspects of the plant design.

Economic evaluations, while often of an "order of magnitude" nature, are mandatory for guiding the over-all development plans, in selecting the proper processing schemes and required equipment, and in preparing plant-investment and manufacturing-cost estimates.

Process design . . . Process design of a commercial plant comprises those activities necessary to establish requirements for proper functioning of the process, including the selection, sizing, and systematic arrangement of basic equipment, piping, and controls. Such facilities must be designed to carry out all operations necessary to produce stipulated amounts of products of desired yield and quality.

Commercial-Plant Design

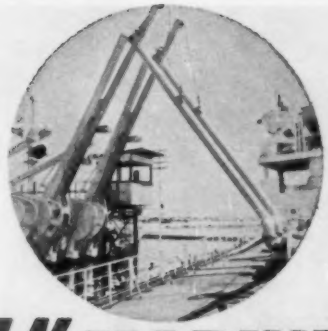
In the process design of a commercial plant, the process engineer makes a comprehensive evaluation of the scope of work and basic design data, including limitations on process, and uses this information to develop process flowsheets;[2] heat and material balances, including usage of all raw materials, chemicals and catalysts involved; major equipment designs and specifications; basic plant arrangements; and requirements on utilities and related services.

When the job schedule permits and sufficient design information is available, it is good practice to prepare engineering flowsheets[6] and a layout model of the plant, as part of the over-all process-engineering work. Whereas the process flowsheet reflects the fundamental process design, the engineering flowsheet is important as the starting point for the definitive design of processing facilities.

The layout model is developing increased importance as an economical and efficient tool for establishing the general arrangement and orderly process sequence of all the major process facilities. Process design and equipment layout are undoubtedly the two most important aspects of the over-all plant design.

All of the basic data relating to the process engineering of the plant are then summarized and forwarded, generally in a process design transmittal[5] to project engineers and designers for their use in the detailed, definitive design of the plant.

Around the World– in Port after Port...



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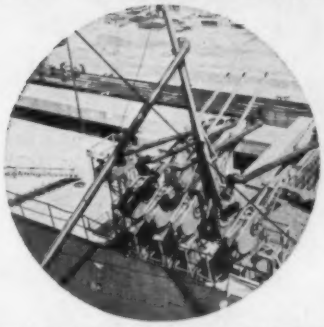
CHIKSAN MARINE LOADING ARMS



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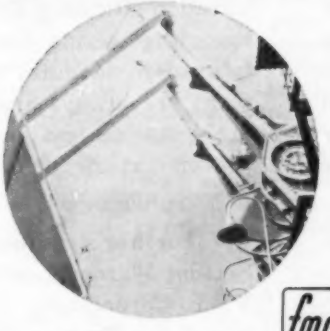

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Separator/Filters have multiple uses

Applications — In today's modern refineries and petrochemical plants, many processes are highly dependent upon low-cost removal of water and solid contaminants. Fram-Warner Lewis water separator/filters are extensively employed in process applications because their use provides the benefits of improved feed preparation, reduction in catalyst consumption, lower corrosion rates, and water free products.

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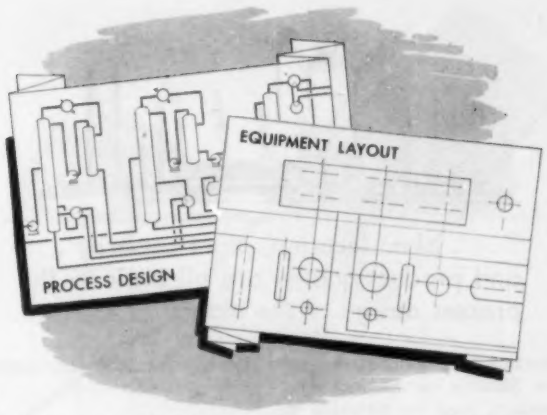
Special Uses—Feed stocks, treated and water-washed products, finished products to storage.

Description — Fram-Warner Lewis separator/filters offer a flexibility of design to meet a variety of process applications — Vertical single stage, horizontal single stage, horizontal two stage separator/filters with entrained water removal efficiencies of 90 to 100% and filtration efficiency down to 5 microns particle size. Engineering design and pressure vessel fabrication facilities at Warner Lewis Tulsa plant are always available to handle special problems to customer specifications. Let proven experience in the field in countless process applications help you.

For Further Information — Write Process Section Warner Lewis Company, Division of Fram Corporation, Box 3096, Tulsa, Oklahoma, for Process Manual on water separators/filters. Warner Lewis representatives are located throughout the United States and Canada and they will be glad to contact plant processing and operating personnel.

Project work . . . Following the completion of process-design work, an increasing number of organizations find it highly desirable to utilize the process engineer in a project capacity because of his general operating experience and familiarity with the specific process involved.

In this connection, the process engineer may, at first, guide or direct the preparation of engineering flowsheets,[6] equipment arrangements, equipment specifications, and other important aspects of the definitive plant-design work and, later, to prepare operating instructions[3] and to follow the startup of the erected plant.



"Process design and equipment layout are . . . important aspects of the over-all plant design."

Design objectives . . . The main design objective is that the commercial plant be erected at a low investment cost and be capable of reliable operation for the life of the plant at low operating and maintenance costs. The over-all plant design and layout should be simple and functional, compatible with the latest applicable process technology, and with all safety, operating, and maintenance requirements.

Process and mechanical hazards must be recognized, particularly as they may influence the design and arrangement of equipment and the safety and fire-protection system to incorporate into the over-all plant design.

During the process-design phases, cost estimates are made, usually of an approximate nature, to guide process decisions and to evaluate investment, operating, and maintenance costs. In addition to a reduction in first costs, savings that can be achieved in plant investment will result in a reduction in equipment depreciation charges, and be reflected in lower operating costs.

Process considerations . . . Criteria, such as plant location, plant capacity, type of operation, operating cycles and on-stream factors, yields, and product quality are all basic to the process design of the plant. In addition, the process engineer should ascertain the effect of changes in reaction conditions on productivity and product quality for the processing routes selected.

The building of contaminants in recycle streams must be evaluated and provisions made for "drag stream" removal and treatment of such contaminants, when required.

Many industrial processes may create polluted wastes, smokes, fumes, dusts, or gases of an obnoxious, toxic or otherwise hazardous nature which must be removed from the process. The design must incorporate adequate exhausting and treating facilities to handle and to dispose of such wastes in conformance with local zoning laws and applicable local, state, and national regulations governing air and stream pollution.

The characteristics of all utilities (steam, water, air, fuels, electricity) must be evaluated and unit costs developed, if possible, to determine the effect on process economies. Both normal and peak-usage values of utilities are to be considered in the design and selection of each item of major process equipment.

Water sources . . . The sources, including analyses, of the various water supplies under consideration must be studied to ascertain (1) the suitability for process use and for portable service, (2) whether a water-treatment scheme is required and has to be developed and, (3) the extent of fouling to be expected when using cooling water in heat exchangers.

Meteorological data for the particular plant location under consideration must be studied for use in developing plot plans; arrangement and support of equipment; proper layout and location of cooling water towers, blowdown and flare systems, and equipment handling hazardous materials; and in establishing which equipment can be located outdoors and which equipment must be housed.

Useful weather data, applicable to plant design and layout, include statistical averages on atmospheric temperatures, both maximum and minimum seasonal levels, maximum velocity and prevailing direction of winds; average relative humidities for each season of the year; and pertinent information on rainfalls, frost lines, snowfalls, and the like.

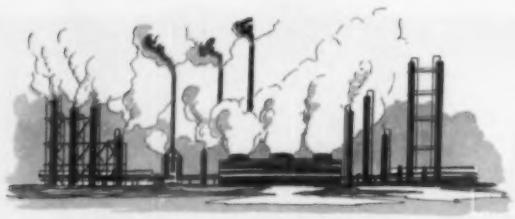
Topographical data must be considered in the arrangement of equipment, particularly with reference to the location of underground piping for transferring wastes by gravity to remote central waste-treating facilities. High points on the ground area may also be considered for the location of facilities such as storage tanks when it is considered desirable to transfer materials from these units by gravity flow.

Instrumentation . . . Provisions should be made for proper control of the process, keeping instrumentation to a minimum, consistent with good operation and sufficient to maintain uniform product quality. Any special or unique instruments essential to the proper control or safe operation of the process must be specified.

Equipment design . . . Contingencies or safety factors in the design and sizing of equipment should be kept to a minimum or at least to a level consistent with projected overproduction demands on plant capacity. In this connection, the mechanical design of equipment must be closely coordinated and must take into account any contingencies incorporated in the process design. Excessive design contingencies are wasteful and result in extra costs for major equipment and for the auxiliaries involved.

As a general guide when specific criteria are not available, it is desirable to design equipment in continuous service to handle loads up to about 5 to 10% in excess of actual requirements. For batch operations in the absence of specific criteria, it is generally customary to design the equipment to perform its service in about 10-25% less time than is actually indicated to be necessary.

In the design and selection of equipment, consideration must be



"... plant location, plant capacity ... and product quality are all basic to the process design of the plant."

given to service and maintenance requirements. Suitable means, including access openings, must be provided to facilitate filling and dumping operations, cleaning, inspection, repair, or replacement of equipment, particularly when handling materials which are dirty, or tend to solidify, coke, gum, or otherwise foul equipment surfaces.

The equipment should be designed so that unscheduled down times are at a minimum. When specifying heat exchangers, for example, allowances must be made for fouling of the heat-transfer surfaces, sufficient to permit adequate periods of operation between scheduled shutdowns.

Needed equipment . . . Standard equipment of proven design which is readily available from manufacturers should be used, wherever possible. Special equipment may be recommended as a result of laboratory or pilot tests and in such instances it is necessary to evaluate the economics of such equipment.

In scaling up equipment to commercial size, consideration must be given to such basic criteria as flow characteristics of materials handled, kinetics, mass transfer, and heat transfer. For equipment, such as filters, centrifuges, evaporators, and size-reduction units, it is generally necessary to conduct performance tests in prototype models before attempting scale-up to commercial sizes.

A prime objective in selecting equipment is to use the least expensive of construction materials which are suitable for a particular service over the useful life of the equipment and which will permit low maintenance and a minimum of down time for repairs. Service requirements will vary in severity of corrosion, erosion, or mechanical wear and it is important to judge the effect of all these factors when estimating the expected life and the cost of replacement in case of failure for each piece of equipment.

Equipment life expectancy is reflected in the equipment obsolescence factors considered in the over-all economics for the particular process under consideration.

Utilities . . . Process and economic considerations of the utilities available at the plant site are required to establish the most suitable type of drive for mechanical equipment, such as pumps and compressors. An electric motor, steam turbine, combustion gas turbine, or expansion turbine may be used to drive moving machinery.

When using electric drives, the type of motor to select will depend on the nature or hazard of the service involved and may be explosionproof, totally enclosed, dripproof or weatherproof. In many petroleum refineries, totally enclosed explosionproof motors are used throughout the refinery, even in locations not considered hazardous, because of the ability of such motors to withstand corrosive attack from moisture and salt air, and from acid vapors and gases, thereby reducing insulation failure.

Some refineries are now using weatherproof and totally enclosed, fan-cooled motors for protection from outdoor atmospheres which are not hazardous.

The various factors to consider in the selection and specification of major process equipment are covered in more detail in an earlier article.[4]

Equipment spares . . . The extent of spare equipment, including duplicate equipment trains, to employ for a new plant installation depends on a variety of process and economic factors:

1. Production requirements — The process economics may dictate that the plant produce a certain quantity of material, as a minimum, over a specified time period. If a loss in production, while replacing equipment, cannot be justified economically, it is then necessary to install spares.

In continuous operations, spares are installed, generally in those processing areas which are critical to the attainment of the desired production goals. Thus, all important pumps and compressors or a critical processing train of equipment may be spared. The spare equipment or duplicate trains are often sized for one-half or one-third of capacity to permit partial production while awaiting repair of the companion equipment.

In batch operations, it is general practice to maintain spares in the warehouse for critical equipment. Sufficient time can usually be scheduled to replace batch equipment with warehouse spares.

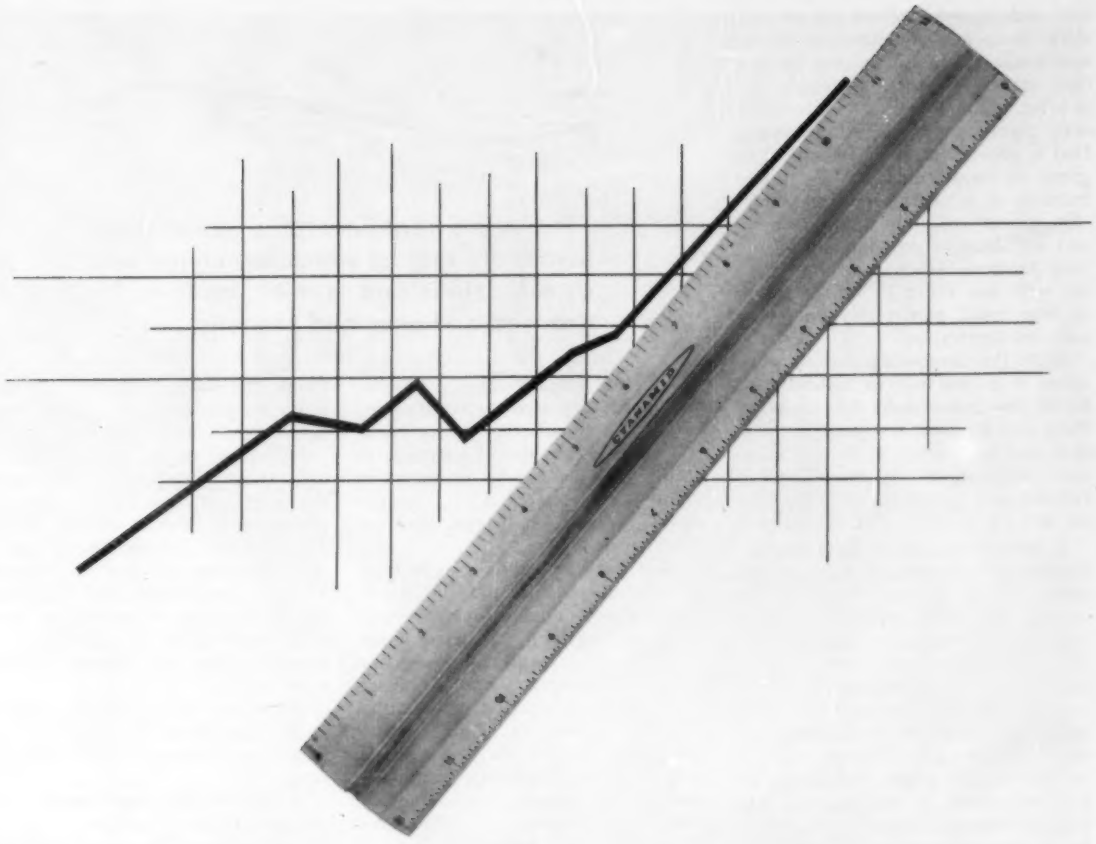
2. Safety requirements — In some processes, failure of equipment could result in safety hazards, with damage to equipment and jeopardy to human lives. It is particularly important in such instances to know the reliability of the equipment for a particular hazardous service. For hazardous services, spares are usually installed so that they are automatically placed in operation should failure of the parallel unit occur.

3. Cost factors—Plant investment is always a prime consideration when considering equipment spares. Where production and safety requirements are not exacting, operating companies will find it desirable to keep the number of installed spares to a minimum.

Plant layout . . . The prime requisites of a good plant layout are that all structures, equipment, auxiliaries, and other facilities be grouped and arranged properly in a manner which will provide a pleasing appearance; result in good working conditions; be accessible to roadways, railways, and harbors, as required; and satisfy all safety, operating, control, and maintenance requirements.

In a good plant layout plant serv-

"The sources, including analyses, of the various water supplies under consideration must be studied . . ."



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ices, such as steam plants and electric substations, and maintenance shops, warehouses, etc., are located so that they are convenient and readily accessible to, and yet do not conflict with plant operations. Many plants find it convenient and economical to group all maintenance services in one building at a centralized location.

A proper and orderly arrangement and sequence of equipment will not only facilitate erection of the plant but will also result in other savings on first costs, particularly on piping and instrumentation.

With the continuing rise in wage rates, it is essential to follow good layout practices in order that all equipment can be erected, operated, serviced, and maintained at high efficiencies. Some of the important considerations and factors to observe when striving for a good plant layout are:

1. Indoor vs. outdoor installation—Because of the inherent savings possible in plant investment and the increased flexibility allowed in plant layout and equipment arrangements, there is a significant trend to erect commercial plants outdoors.

While outdoor construction is obviously better suited to plants located in warm climates, an increasing number of commercial plants are being installed outdoors in cold climates. Today, equipment, including motors, is better designed and more durable, requiring less operating, servicing, and maintenance attention than before.

Process instrumentation has been developed and advanced to the point where many continuous processes need only to house control instruments in a central location. The plant can be operated from the central control room after it is placed on stream since most of the equipment can be handled by remote control.

As a general rule, only that equipment need be housed which is regularly opened and closed and whose contents must not be exposed to outdoor weather. Batch kettles, batch centrifuges, filter presses, flakers, and pulverizers are typical of equipment which is usually housed.

Equipment located outdoors comprises items such as storage tanks, most pressure vessels, fractionators, pumps, heat exchangers, evaporators, and the like. Compressors, both reciprocating and centrifugal, are generally sheltered in a structure, often with exposed sides, and equipped with overhead cranes for service purposes.

2. Safety requirements — Primary consideration must be given to the safe arrangement of equipment and accessories, to permit fire fighting and to cope with any other process and mechanical hazards which may arise.

"The prime requisites of a good plant layout are that all structures, equipment, auxiliaries, and other facilities be grouped and arranged properly . . ."

Sufficient spacing must be allowed between equipment and adequate stairways, ladders, and other escape facilities must be provided. Equipment in hazardous areas should be spaced in accordance with applicable insurance regulations and local, state, and national codes.

Open flames, such as in fired heaters and flares, must be sufficiently remote from equipment storing, processing, or handling flammable materials. A snuff system may be used on refinery heaters to allow for short-time continued operation and avoid an explosive atmosphere, should a leak develop in one of the heater tubes.

In locations handling flammable materials, equipment, such as vessels, pumps, compressors, and motors must be permanently grounded using a grounding system of sufficient capacity to provide for electrical static, and lightning protection.

For equipment handling hazardous materials, dikes should be installed around storage tanks to control the spread of fire on any spilled material. Toe walls are often installed around pumps and exchangers in hazardous service.

3. Operating requirements—To keep the number of operators to a minimum, the various processing steps and their sequence must be evaluated on the basis of providing sufficient space convenience and accessibility to all the equipment and controls involved in the storage, processing, and general handling of chemicals and materials. Proper spacing between equipment is essential to good operation.

Such equipment as control valves and instruments should be located at grade preferably or at a platform level accessible and convenient to the operator. When equipment must be elevated for material flow reasons, consideration should be given to convenience of operation and accessibility.

Processing areas should be arranged in proper relationship to one another so that the amount of interconnecting process and utility piping is at a minimum and so that there is sufficient space for pipeways and conduit racks and for entry of all utilities.

Operations or equipment of similar type should be grouped to simplify the attention required by operating personnel. Provisions should also be made so that like equipment may be used interchangeably when required. This is particularly true of pumps which are often arranged in an accessible line or bank for convenience of operation and for interchangeability of service.

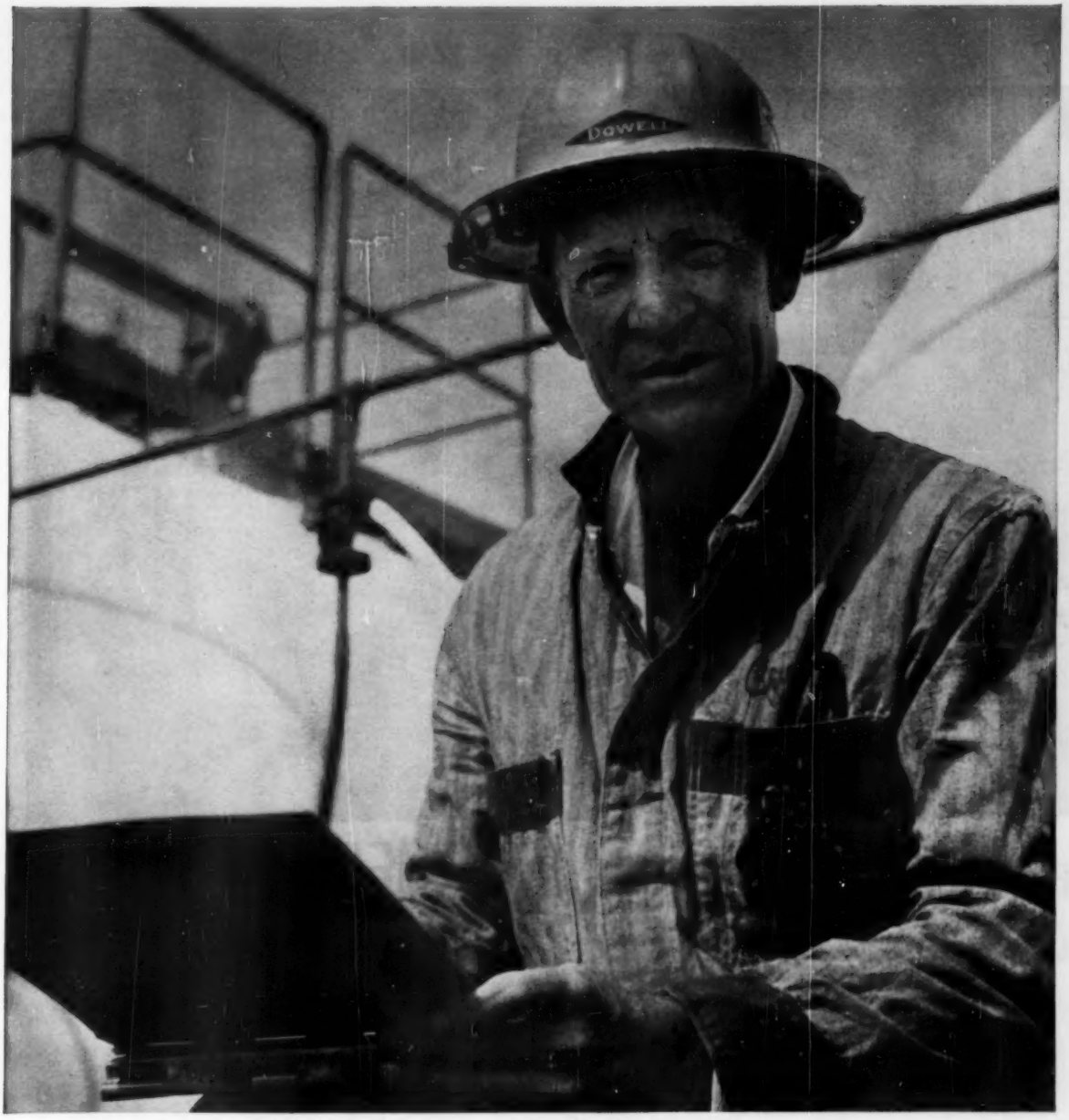
Sufficient space must be reserved in the plant layout to handle any projected requirements for additional equipment.

4. Maintenance requirements—Ample working space, aisleways, and accessways should be provided (a) for easy servicing and inspection of equipment, (b) to facilitate general maintenance cleaning, repairing, and removal of equipment, and (c) to allow passage of mobile maintenance equipment within the plant boundary limits.

Equipment, particularly those items with moving parts, should not be crowded by other equipment, structures, piping, and electrical conduit and should be capable of being removed safely and without interferences or conflicts with adjoining facilities. Equipment should be arranged so that it can be removed by built-in hoisting apparatus or can be freely approached by mobile maintenance equipment and removed from place.

References

1. "The Role of Pilot Plants in Processing," The Oil and Gas Journal, November 3, 1958.
2. "What You Ought to Know About Process Flowsheets," The Oil and Gas Journal, November 17, 1958.
3. "How Clear Are Those Operating Instructions?" The Oil and Gas Journal, November 24, 1958.
4. "How to Select and Specify Process Equipment," The Oil and Gas Journal, January 12, 1959, and January 19, 1959.
5. "Process Design Transmittal," The Oil and Gas Journal, February 9, 1959.
6. "Engineering Flowsheet," The Oil and Gas Journal, February 2, 1959.



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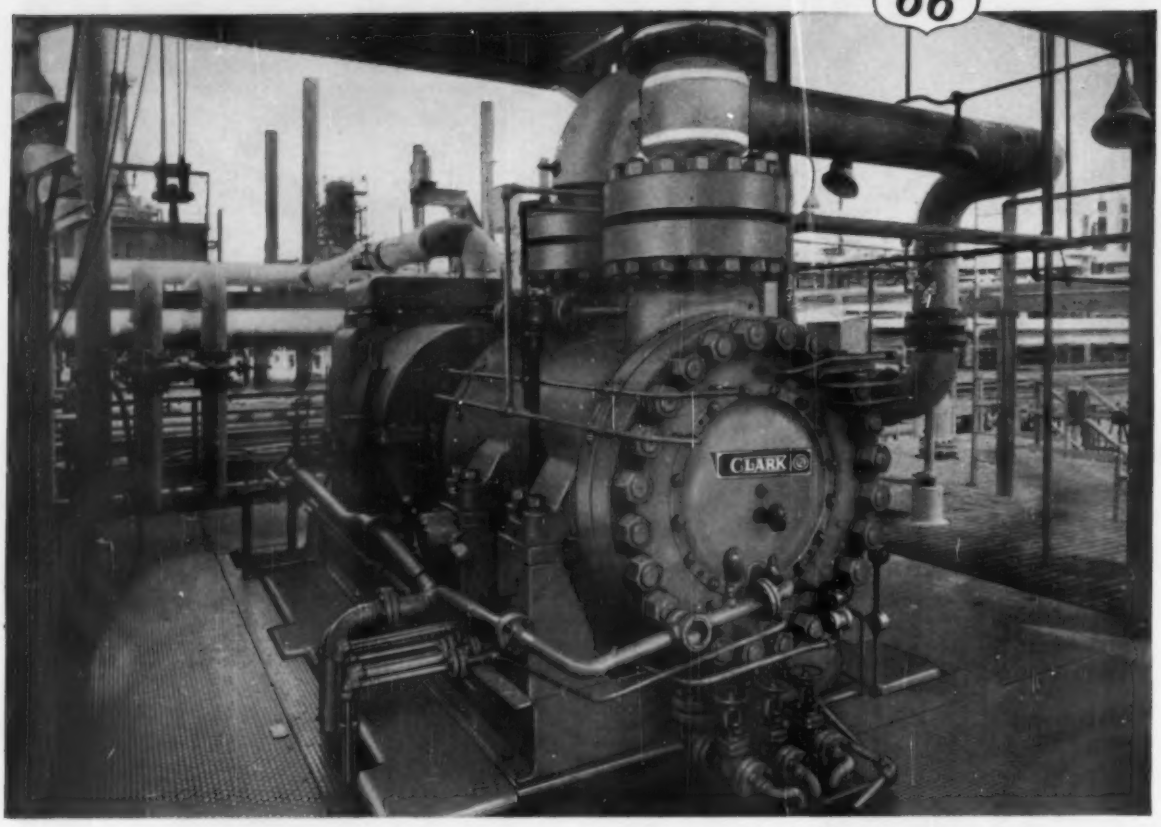

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To handle the hydrogen recycle phase of the process at the Borger, Texas plant, a Clark Vertically-Split Multi-Stage Centrifugal Compressor was selected. While the ratio of hydrogen to hydrocarbon is low in this process, the high feed capacity requires 2,000 hp for hydrogen circulation. As in many other similar processes, the performance of this Clark compressor has from startup met the rigid design requirements.

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CLARK BROS. CO., OLEAN, NEW YORK

API recommends test for h.-p. tubing, casing connections

ITS FIRST recommended test for evaluating high-pressure connections for oil-well tubing and casing has just been issued by the API's Division of Production.

In the past there has been no universally accepted basis for comparing different connections available for service on wells with surface pressure above 5,000 psi. Buyers couldn't tell if one manufacturer's product was better than another's. And, manufacturers had no commonly accepted basis on which to demonstrate the worth of their connections. API's new recommended test will make it easier to compare the designs and to evaluate new designs as they appear in the future.

The recommendation covers five loadings:

1. Internal pressure.
2. External pressure.
3. Tensile loading.
4. Compressive loading.
5. Torque.

API warns that it isn't to be inferred that all connections which pass this particular test will perform satisfactorily in the field. There are other factors to consider, such as:

1. Susceptibility to damage in handling.
2. Critical stress concentrations within the connections.
3. Maintenance of tolerances.
4. Susceptibility of sealing elements to corrosion.
5. Bending stresses.
6. Clearances.

Internal pressure . . . Connections for high-pressure service should hold pressure near the yield strength of the pipe body for long periods without leaking. As a well is alternately shut in and produced, there is a fluctuation in pressure, temperature, and tensile loading on the connections. These fluctuations should not affect the ability of the connection to seal.

First step in API's new recommended test is a straight hydrostatic test. The connection is made up to optimum and tested hydrostatically to a pressure equal to 95% of the tabulated minimum internal yield pressure of the pipe body. In this test, the specimen connection is in a 180° F. water bath. Pressure is held for 5 minutes and the test repeated 3 times.

Then, the specimen is charged with dry nitrogen gas to a pressure equal to 90% of minimum internal yield of the pipe body. Starting with a water temperature of 180° F., the bath is alternately lowered to 80° F. and raised back to 180° F. This "thermal cycling" is repeated 100 times, pausing long enough at each temperature extreme for the specimen to stabilize at that temperature.

The test procedure also calls for long-term static gas-pressure tests. This involves exposing the test specimens which have gone through the thermal cycle test to outside atmospheric temperature for 90 days. At the end of that time, the connection is checked for loss of pressure.

Torque and makeup . . . Some types of scratchers require that the casing string be rotated. Rotation puts a torque loading on the connections. When setting some types of packers, the torque loads on tubing can be quite high, especially in a crooked hole. Moreover, tubing strings are sometimes used for light drilling or reaming. These things make it important to know how much torque a tubing or casing connection can withstand.

For both tubing and casing, it is important to know the minimum torque required for a seal and the maximum torque that does not damage the connection.

To check the maximum torque or makeup position of a connection, the new API recommended test calls for torquing a specimen connection until there is damage to threads or to sealing elements. Trial-and-error methods are used to check the minimum torque needed to get a seal.

As a further check, specimen connections are made up and broken out 20 times. After each breakout, the connection is checked for damage. Then, the same connections (if used on tubing) are given a repeat of the hydrostatic pressure test and the thermal-cycling test.

External pressure . . . The API points out that a connection should be capable of withstanding as much external pressure as will the body of the pipe. In the well, tubing is usually set on a packer. Mud is left in the annulus. Weight of the mud is high enough to balance, or exceed, the bottom-hole pressure. However, as bottom-hole pressure falls with time, the external-pressure differential increases.

The oil string generally is not subject to external pressure when set. But, there are cases when extremely high differentials do occur. One such case is when bottom-hole pressure declines. Another is when the fluid originally left in the annulus is replaced with a lighter fluid during workover.

For these reasons, specimen connections which have had the static-gas test are also given an external-pressure test. This is a hydrostatic pressure test with the outside of the connection pressured up to 80% of the minimum collapse pressure of the pipe body. This test is made at atmospheric temperature and the pressure is held for 24 hours. During that time the inside of the connection is open to the atmosphere.

Tensile strength . . . In casing and tubing strings, initial tensile loads equal the weight of the string in the fluid in which they are set. However, the bottom sections of the strings are fixed —as when casing is cemented and tubing set on a packer. Then, additional tensile loads can be caused by decreases in pressure or temperature inside the strings. Other loads must also be considered. Some of these are caused by reciprocating casing while cementing and by pulling stuck packers with tubing. For these reasons the ultimate strength of the connection must be known. From this a design factor may be picked to offset conditions that occur after the string is set.

The API recommended procedure calls for making a combination tensile, internal-pressure test. First, the speci-

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men is charged with water to a pressure equal to 80% of the tabulated minimum internal yield of the pipe body. Then, a tensile load is put on the connection. This tensile load is 80% of the design yield strength of the joint less the tensile load caused by internal pressure (internal pressure multiplied by cross-sectional area).

This tensile load is put on for at least 5 minutes and then released. The test is repeated three times and internal pressure is checked after each cycle.

After this tensile-hydrostatic test, some of the specimens are pulled to destruction to determine their ultimate tensile strength.

Compressive loading . . . API says that a connection should withstand high compressive loads without damage. It points out that in running both tubing and casing, there are sometimes obstructions in the hole. In an effort to get by an obstruction, most, if not all, of the weight of the string may be set down.

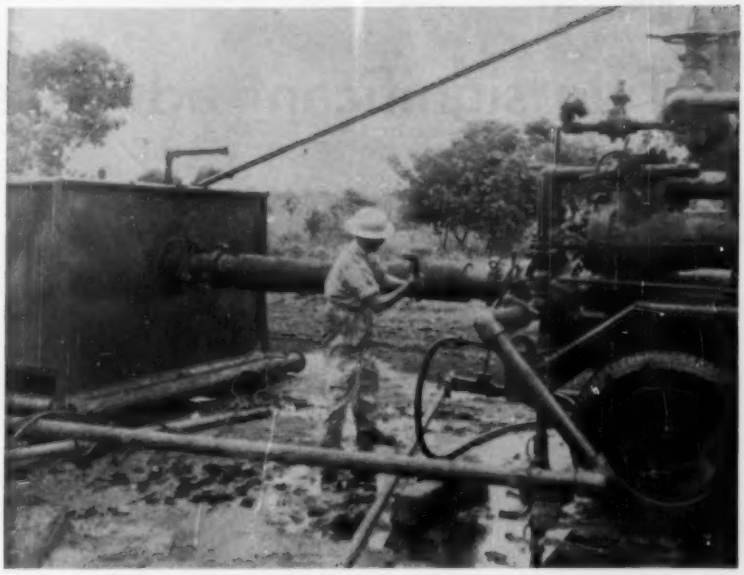
A common case of compressive loading in tubing strings is in setting packers. From 10 to 20% of the weight of the string is often set on a packer when the well is completed. Later, the tubing string can be elongated by increases in temperature or a reduction in internal pressure while producing the well. The result is that much of the tubing string is in compression.

The new API recommended procedure gives no specific test for the effect of compressive loading of tubing connections. However, the document points out that the effects of compression and bending should be considered in both tubing and casing connections.

There is a compression test for casing connections. A compressive load equal to 80% of the tensile load used in the tensile-strength test is put onto the connection and then released. The procedure is repeated three times. After this, the specimens are hydrostatically tested.

Materials, tolerances, etc. . . . The foregoing is merely an outline of the API's recommended tests; it does not cover the details. The test document itself sets out not only test procedure but such things as number of specimens to be tested, material of construction, length of specimens, manufacturing tolerances, finish, thread compound, use of filler bars, recording of results, and use of detergents and dye in testing water.

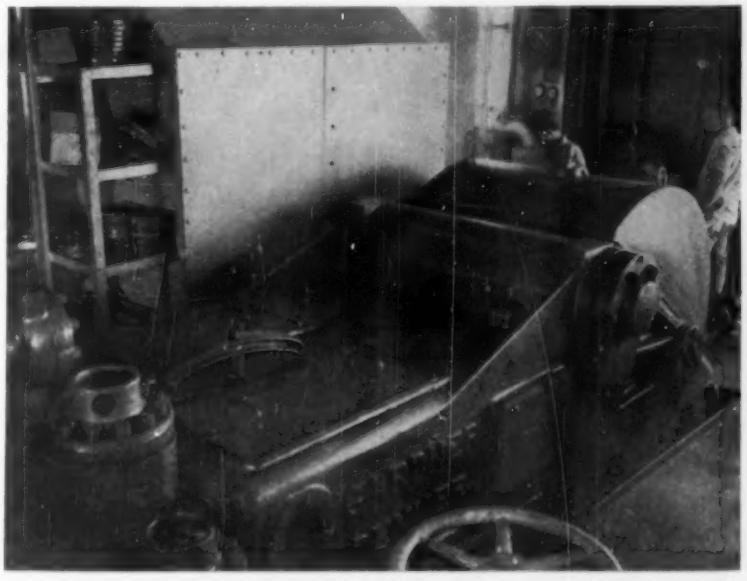
For copies of the test procedure, write API's Division of Production, 300 Corrigan Tower Building, Dallas. Ask for API RP 37.



Dog leg speeds mud-tank connection

IN THE POZA RICA FIELD in the State of Veracruz, Mexico, Pemex builds the mud tanks with a dog leg on the inside of the discharge line so that the line is elevated on the out-side to the level of the suction valve

on the trailer-mounted mud pump. This allows a quick operation by connecting the mud-tank side first and then spotting the truck to fit. It also keeps the hose up out of the mud, prolonging its useful life.



Motors separated by wall from pumps

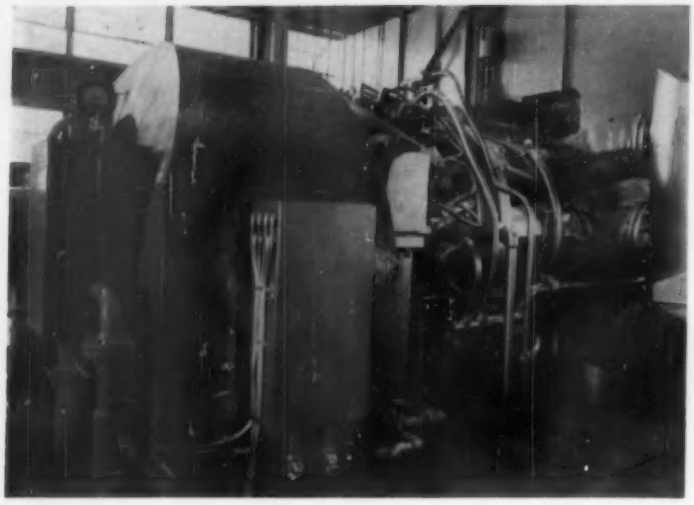
ON THE BARGE RIG "El Dorado" of Ocean Drilling & Exploration Co. drilling offshore for Petroleos Mexicanos, the motors are set on the end of the drive shaft of the usual manner, but a bulge in the engine room allows the motors to be entirely separated from the pump.

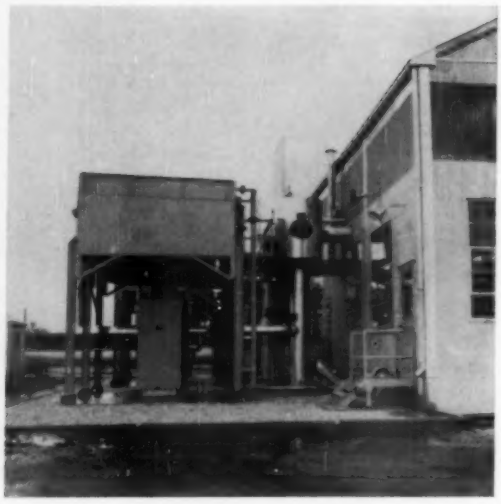
This is a safety feature in case the pump should spring a leak when pumping flamable liquid and also has the merit of being a good housekeeping measure.

The pumps can be washed down daily without danger of getting water into the motors.

PIPELINES

Two significant advances . . .



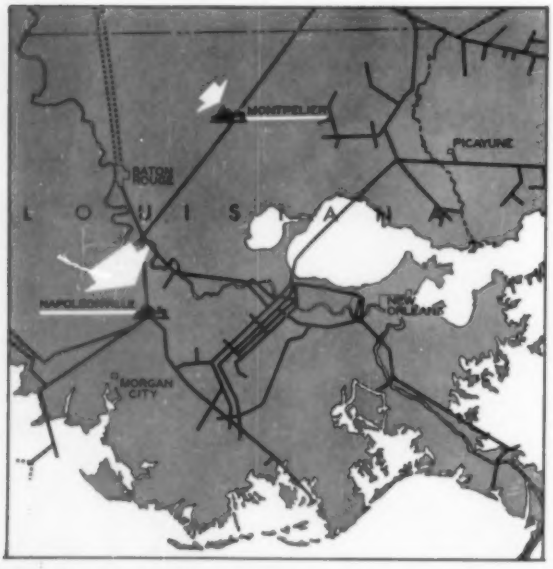


(1) gas turbine at origin of line

(2) ebullient jacket-water cooling

. . . mark operation of United Gas Pipe Line

Until this company installed a gas-turbine unit at Napoleonville, the industry assumed that a recip would always be necessary at an initial upstream station.



MAP showing location of Napoleonville gas-turbine station as an initial upstream station of a main transmission line. The gas-turbine unit is shown at top left. Photo at top right shows cooling units outside Cabeza Creek station.

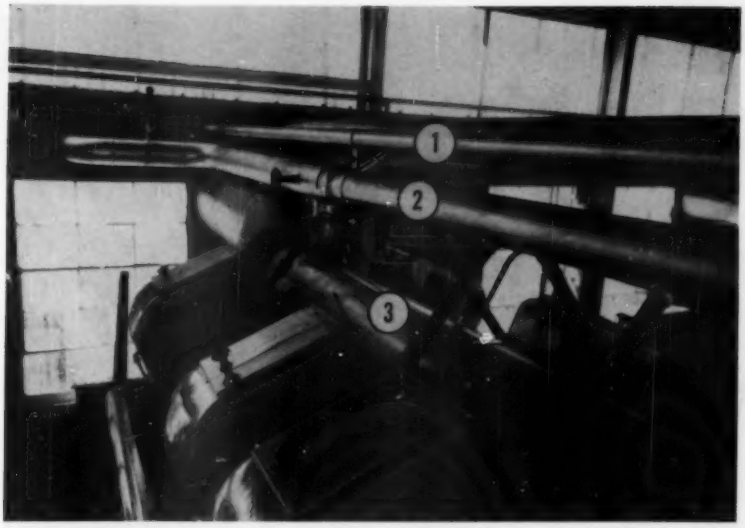
BY H. W. EGGER
General Superintendent of Compressors
United Gas Pipe Line Co., Shreveport

PROGRESS in any field of endeavor requires taking the necessary steps to take advantage of new ideas and placing them in operation.

We feel we have taken such steps in departing from practice of utilizing a reciprocating station at the origin of a line by installing a single turbine centrifugal-compressor unit. Likewise, we have departed from the usual practice of jacket-water cooling in one of our stations by use of ebullient jacket-water cooling and utilizing the heat in the steam thus generated to supply the necessary power to drive the fan for steam condensation and oil cooling.

Napoleonville Compressor Station

The gas-turbine station located at Napoleonville, La., is the first of four



TOP OF ENGINE showing positions of three lines: (1) Crankcase vent line, (2) the 8-in. water-steam header from engine to separator, and (3) engine exhaust manifold.

stations on a 30-in. transmission line carrying gas from South Louisiana to northern Mississippi. The other three stations north along the line from the gas-turbine station are reciprocating stations at Montpelier, La.; McComb, Miss.; and Jackson, Miss. The Napoleonville unit is a GE gas turbine rated at 5,700 hp. at 80° F. ambient air temperature, driving a De Laval centrifugal compressor. The station was placed in service in November 1953.

Gas from offshore to the southwest and gas from Lirette field to the southeast of Napoleonville are fed into a common inlet line to the Napoleonville gas-turbine centrifugal unit. Thus this station heads the line and controls the flow which has varied from a rate of over 600 M.M.c.f.d. to less than half that much in a single 24-hour period. Industry has usually dictated that the first station on a transmission line must be a reciprocating station to obtain the necessary flexibility; however, operation of the gas-turbine centrifugal station has exceeded our expectations in this respect.

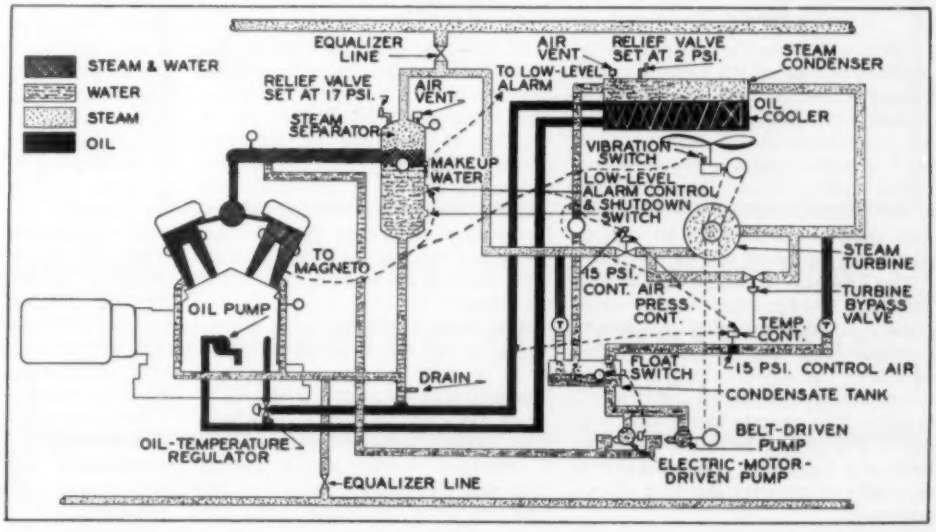
We were able to successfully depart from usual practice of installing reciprocating units at this station because of the consistently high suction pressure available, even though the flow rate varies widely. The high suction pressure is possible because of the high well pressure in the fields feeding the station. Also the station can be shut down for required inspections and maintenance during periods when the required delivery is less than 600,000 M.c.f.d.

During the period of July 5, 1958, through August 21, 1958, Napoleonville was down for inspection and Montpelier (the next station downstream) had a peak day volume of 606,755 M.c.f. and an average daily volume of 501,061 M.c.f. During September with both stations in service the peak day volume at Montpelier was 647,942 M.c.f. with a daily average volume of 554,533 M.c.f. Napoleonville had an all-time peak day on January 17, 1956, when it pumped 683,560 M.c.f., with an average suction pressure of 884 psi. and 930 psi. discharge pressure.

Napoleonville station has performed very satisfactorily since it was first placed in service. There have been periods of down time required to make changes of turbine blades recommended by the manufacturer due to failures of blades of like material on other turbines, change of air filter, and finally, required maintenance for repair of air silencer. Otherwise the down time of the turbine has been nominal.

Maintenance costs have been exceptionally low, the largest single cost being the replacement of the air filter. The original filter used an air wash and was discarded after a year when it was found unsuitable for this location. Trouble came from the "cane bug," an insect which would get through the filter and foul the blading in the axial air compressor. This filter was replaced with one using a treated fiber-glass-roll type of element, which has been doing an excellent job.

The air silencer as installed was made of perforated-steel plates enclosing sound-absorbent material. During inspection it was found that these steel plates were corroding excessively and they were replaced with aluminum



VAPOR-PHASE flow diagram. Steam from top of the separator goes to the steam turbine; turbine exhaust goes to steam condenser. Condensate from the tank is pumped. Water from the separator returns to the power cylinder jackets by gravity.

plates which should solve the problem.

Operation costs of the gas turbine at Napoleonville are comparatively low. Labor requirements of this single-unit station are less than those of similar-sized reciprocating stations. Fuel consumption averages 12 cu. ft. per hp-hr. Lubricating-oil performance averages 75,000 hp.-hr. per gal. or 30 gal. per month.

The following is a log of the station operation. All of the down times after the initial operating period have been scheduled during periods of light load and no loss of delivery has been experienced.

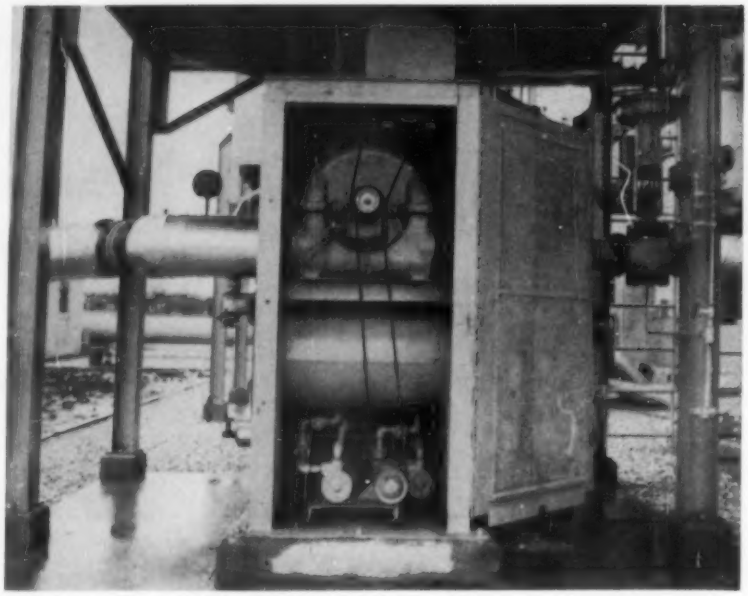
MAJOR DOWN TIME, NAPOLEONVILLE COMPRESSOR STATION

	Hours	
	Down	Run
Station on line Nov. 7, 1953	....	137
Station down for check, Nov. 13, 1953	312	....
On line Nov. 19, 1953	....	346
Down for check Dec. 4, 1953	64	....
On line Dec. 7, 1953	....	704
Down for check Jan. 5, 1954	51	....
On line Jan. 8, 1954	....	2,285
Down for inspection April 1954	387	....
On line	....	2,329
Down for inspection July and August 1954	673	....
On line	....	7,914
Down for inspection July and August 1955	650	....
On line	....	7,185
Down for modification of turbine blades, June and July 1956	1,236	....
On line	....	592
Down for change out of turbine blading as recommended by General Electric	246	....
On line	....	8,039
Down for inspection, Sept. 1957	334	....
On line	....	6,564
Down for inspection, July and August 1958	1,153	....
On line remainder of 1958	....	3,157
Totals	5,106	39,252

Ebullient Cooling at Cabeza Creek Station

After a full year's operation with ebullient cooling of the engines at the Cabeza Creek station, we are well pleased with results. The engines are being efficiently cooled and there have been no undue operating problems due to this cooling system. Measurements of the power-cylinder liners show less wear than would normally be expected for this period of service.

The 2,640-hp. Cabeza Creek station has three 880-hp. reciprocating compressors for delivering field gas into a gasoline plant. The station is attended during the daytime only and sufficient automatic controls are installed to allow it to operate unattended during the night. The self-controlling features of ebullient cooling make it especially adapted for this type of operation.



ONE OF THE THREE STEAM TURBINES. Steam intake is at right; exhaust steam outlet is at left.

Ebullient cooling, normally called vapor-phase cooling, is a method of cooling by using the latent heat of vaporization of the coolant instead of increasing its temperature. That is, the cooling water "boils" in the engine jackets and a mixture of steam and water leaves the engine jackets.

This method of cooling requires a lower circulation rate and does not need a pump for forced circulation as sufficient circulation is created thermally by the mixture of steam and water in the engine. As cooling is accomplished by changing water into steam, it is not necessary to have a change in coolant temperature within the engine. Actually, at Cabeza Creek we are unable to measure any temperature difference across the engine with industrial temperature-measuring devices.

In the system as installed at Cabeza Creek, water enters the engine jackets near its boiling temperature. This water is cooled slightly due to heat loss of the piping. As the water comes in contact with the cylinder jackets, a portion is converted into steam causing the mixture to become less dense and to rise. After leaving the engine the mixture enters a steam separator and the water is returned to the engine.

The steam flows from the separator to a low-pressure steam turbine where it expands to near atmospheric pressure. The steam then flows to a steam condenser where it is condensed. The condensate flows by gravity into a condensate receiver and is pumped back into the engine. The steam turbine drives the condensate pump and the fan for the dry-air cooler which condenses the exhaust steam of the turbine and cools the lubricating oil.

The pressure under which the system operates is self-regulating and varies with the engine load and ambient temperature. That is, when the engine is operating under full load during hot weather, more cooling is provided by increased pressure which drives the fan faster. The pressure varies between 5 and 15 psi., and turbine speed varies between 1,000 and 3,000 r.p.m.

The installed cost of the system is comparable to conventional cooling systems. A smaller amount of cooling surface is required to condense steam than to cool water, the circulating pump is eliminated, and power is not required to drive the cooling fan. Larger lines, a steam separator, and a steam turbine are required which would not be required normally. As this design is improved, we expect to further reduce the cost of similar installations.

The cooling equipment for this installation was furnished by Engineering Controls, of St. Louis. The turbine, condensate tank, condensate pump, and fan drive are housed in an insulated structural support for the fan which reduces the installation cost, and provides a compact installation with the necessary insulation of turbine, condensate tank, pump, and other accessories.

As stated above, the operation is very satisfactory. Additional data on the performance will be presented in an early paper for the American Gas Association.

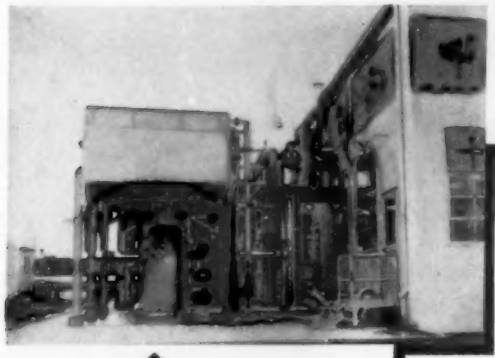
UNITED GAS PIPE LINE CO. INSTALLS VAPOR PHASE®

to cool 3 compressor units with own waste heat

System Increases Engine Output and Life; Reduces Cylinder Wear; Would Permit Use of Sour Gas Fuel

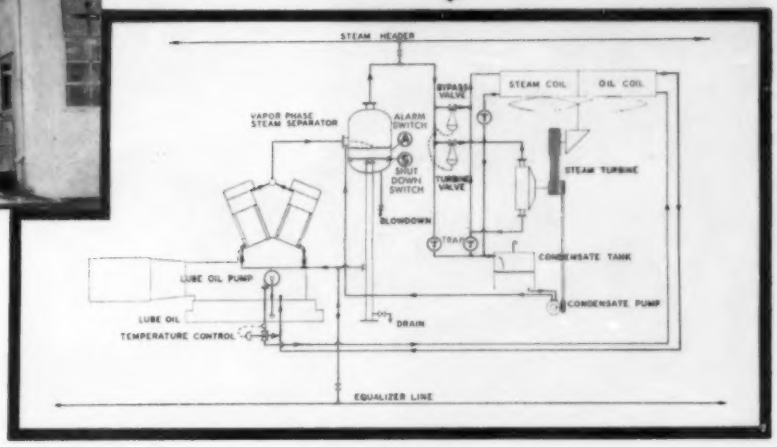
The 3-880 H. P. Gas Compressors at UGPL's Cabeza Creek station, near San Antonio, Tex., installed in 1957, are taking the power to drive their cooling fans from the waste heat of their own operation. The formerly wasted heat is taken from the VAPOR PHASE® separators in the form of low pressure steam. This steam drives the cooling air fans through steam turbines, an exclusive patented feature of the Vapor Phase System.

The decision to install Vapor Phase® Thermal Circulation Cooling was based on the successful operation of a similar installation, made in 1953, on 5-880 H. P. engines at UGPL's Agua Dulce Station which resulted in better combustion, reduced cylinder and ring wear and lowered operating costs.



CABEZA CREEK STATION — Steam generated from waste heat passes through Vapor Phase® Steam Separator and operates turbine driven fan, condensing the steam and cooling the lube oil. Operating costs are reduced while freeing the engines for greater power output.

VAPOR PHASE® FLOW DIAGRAM — water and steam from the engine power cylinders flow through a header to the Vapor Phase® steam separator. Steam produced powers the turbine driven fan which furnishes air to dissipate engine heat. All condensate is returned to the water and steam header. Water from the separator circulates through the power cylinder jackets by gravity.



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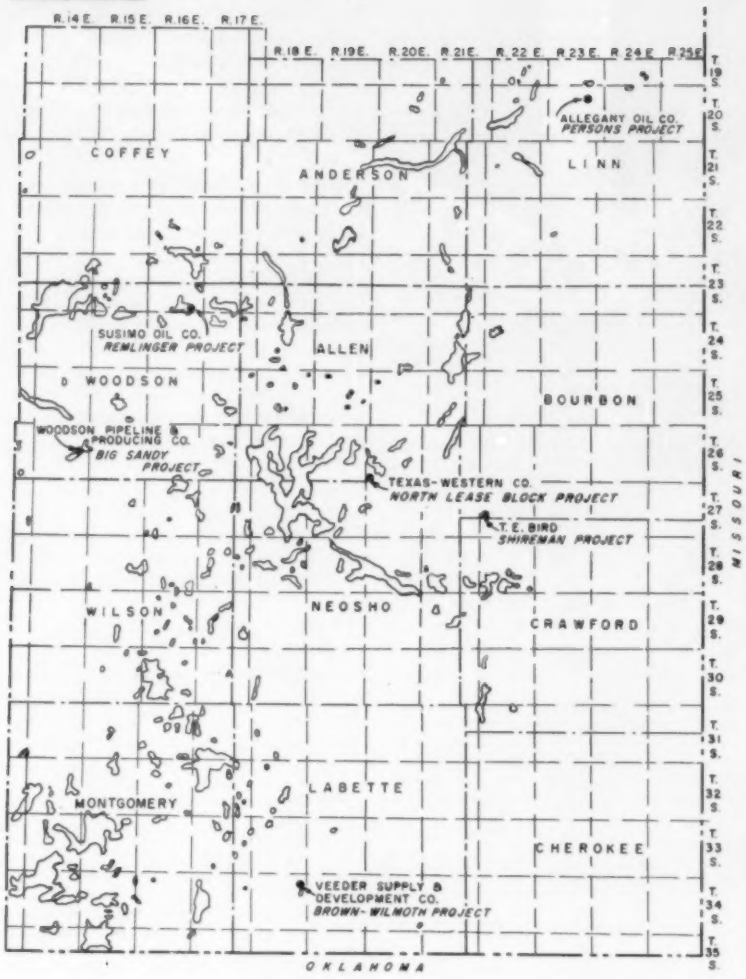
BP



Study of six water-flood projects in eastern Kansas shows that . . .

Viscous crudes respond to water flooding

THEORETICAL ANALYSIS of the water-flood problem by many investigators has led to the general conclusion that a favorable mobility ratio is required for successful results. A recently completed report* by J. P. Powell, of the Bureau of Mines, covers some Kansas water floods in which viscous crude is being recovered in spite of unfavorable mobility ratios.

In some of the older, semidepleted fields in Kansas and Oklahoma, the oil has lost most of the gas originally in solution, and the residual oil has a high viscosity. Material-balance calculations of the simplest type will show that there is a profitable amount of oil left in the reservoir, and recovery of that oil is important.

According to Calhoun, the significant factors affecting water flooding are: (1) fluid character, (2) rock character, (3) rock-fluid interrelationships, (4) operational history, and (5) operational control.

For older reservoirs, only one of these factors, operational control, can be changed by the operator. Much thought has been given to favorably changing the mobility ratio by increasing the viscosity of the displacing fluid or decreasing the viscosity of the oil. The former is impractical because of limitations as to the maximum injection pressure that may be used without damage to the reservoir, increased power cost for injecting a more viscous fluid, slower producing rate, and greater cost of most fluids of this type. The viscosity of the oil can be reduced by heat, but this is an expensive operation.

Because it is difficult to evaluate the effect of oil viscosity on the results of a water flood, independent of the many other variables, the purpose of this report is to give the results of several projects producing oil of more than average viscosity. Six projects in eastern Kansas, producing from four different sands, were studied in detail, and the results are included in Table 1 and the discussion that follows.

Allegany Oil Co., Persons Project

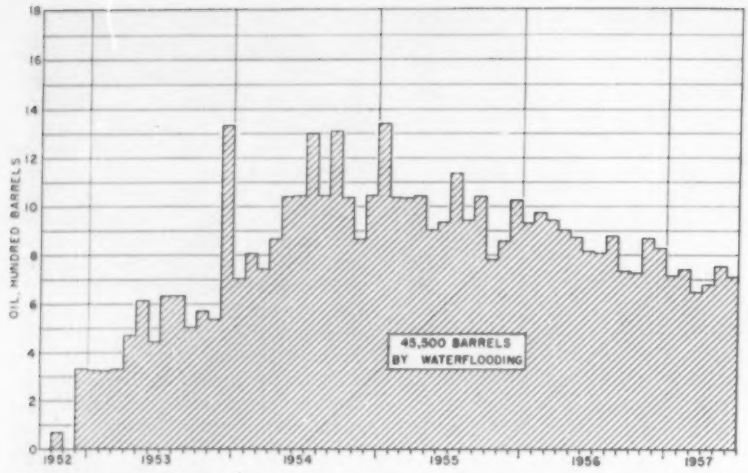
During 1953, a pilot flood in the upper Peru sand was abandoned, and a test was started in the lower member. The operators, encouraged by the success of the test, expanded it to include 23 acres on the Persons lease and 4 acres on the Hampton lease. There are 19 producing wells and 27 injection wells in the flooded area.

. . . Wells shot. Both injection and production wells were drilled with cable tools, the old wells being carefully plugged with cement. All wells were shot, as a routine part of the completion procedure, with 30 to 40 qt. of nitroglycerin.

. . . Intermittent pumping. The producing wells are pumped off each morning and then shut in to allow the oil to accumulate in the 20-ft. "pocket" drilled below the oil sand.

. . . Water treatment. Fresh water used for injection is obtained from a gravel bed about 40 ft. deep. The water is pumped into a 100-bbl. storage tank where it is mixed with the brine produced from the oil wells. The brine is aerated and allowed to settle before being pumped into the tank. The mixed waters flow by gravity from the storage tank through a closed filter. The filtering medium is gravel and crushed anthracite. From the filter, the water goes to a clear-

*Bureau of Mines Information Circular 7873, by J. P. Powell, United States Department of the Interior—1959. A free copy may be obtained by writing to Publications Distribution Section, U. S. Bureau of Mines, 4800 Forbes Street, Pittsburgh 13, Pa.



ALLEGANY OIL CO. Persons project water-flood production history. This property was first developed in 1919, but primary production data are not available.

water storage tank, which supplies the injection pump intake.

... Breakthrough prevented. Injection pressure is carefully observed to prevent channeling or breakthrough of the injected water. A breakthrough is indicated by a sharp increase in the injection rate in one well. When this occurs, the offending well is shut in for a few days. Injection is resumed cautiously and pressure built up slowly.

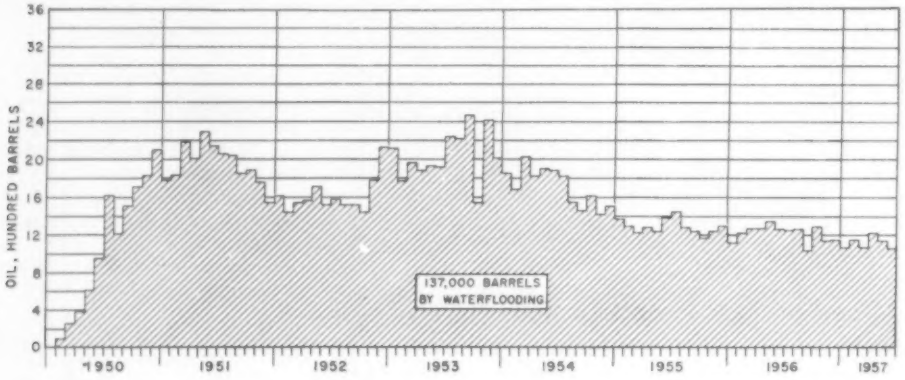
... Flood results. Through June 1957, a total of 45,480 bbl. of oil had been produced as a result of water flooding. A total of 260,800 bbl. of water had been injected up to the same date. The project has a probable economic life of 114 months, and an additional recovery of 31,000 bbl. of oil is expected.

T. E. Bird, Shireman Project, Hepler Field, Bourbon County, Kansas

This flood started as a pilot project in October 1949. It has since expanded to a flood with 24 injection wells and 29 oil wells, covering approximately 50 acres. The first oil well on the lease was drilled in June 1917, and the lease was abandoned in 1922 following an unsuccessful attempt to stimulate production by air injection.

The project was developed on a random spacing, approximating a five-spot pattern. Both injection and producing wells were completed with 2-in. tubing set on a rag packer and cemented at the top of the oil sand. The old wells were reconditioned and shot, and the new wells were shot with 1 to 5 qt. of nitroglycerin per foot of oil sand.

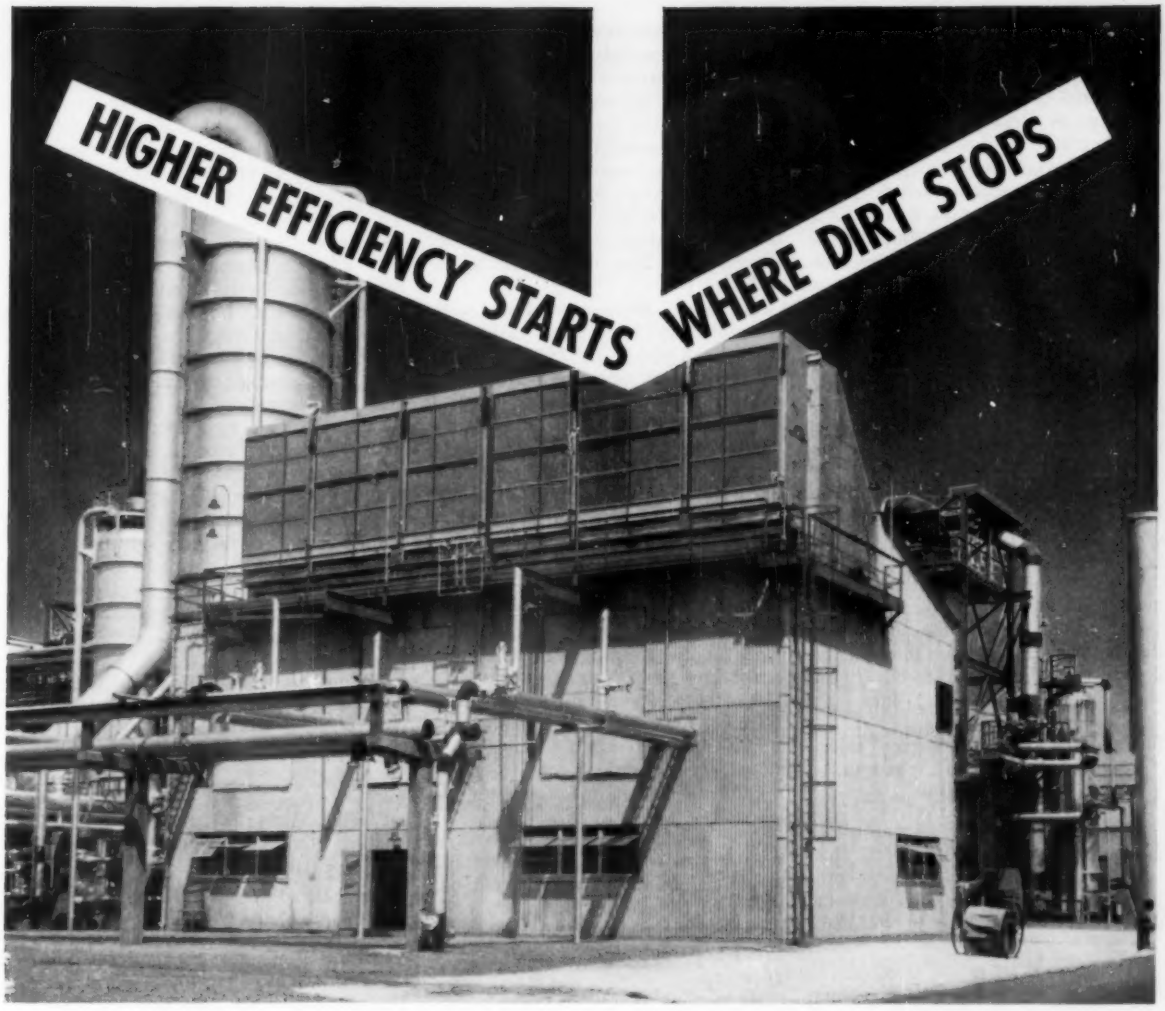
The oil wells are equipped for pumping with insert barrels through 1-in. pipe and pumped continuously



T. E. BIRD Shireman project is producing, by water flood, from a field originally developed in 1917. It was abandoned in 1922. No primary production data are available.

TABLE 1—PROPERTIES OF EASTERN KANSAS WATER-FLOOD PROJECTS

	Persons project	Shireman project	Remlinger project	North Lease project	Brown-Wilmoth project	Big Sandy project,
Location	Sec. 11-20s-23e	Sec. 19-27s-22e	Sec. 24-23s-16e	Sec. 29-26s-20e	Sec. 13-34s-18e	Sec. 14, 22, 23-26s-14e
Area (acres)	27	50	90	25	20	120
Well pattern	5-Spot	5-Spot	Irregular	Irregular	Inverted 5-spot	Irregular
Sand flooded	Peru	Tucker	Squirrel	Bartlesville	Bartlesville	Bartlesville
Average sand thickness, ft.	15	14	8	19	6	40
Porosity, %	20	20	22	21	16	20
Permeability, air, md.	106	113	9	362	83-141	75
Oil saturation, %	58	42	45	40	32-55	45
Water saturation, %	27	40	20	38	22-45	36
Depth, ft.	220	600	950	800	560	1,300
Type of water	Fresh	Brine	Brine	Brine	Brine	Brine
Type of system	Semiclosed	Open	Closed	Closed	Closed	Closed
First injection	Sept. 1952	Oct. 1949	Feb. 1952	June 1955	Dec. 1954	.....
First oil increase	Dec. 1952	Feb. 1950	June 1952	July 1956	July 1955	1945
Gravity of oil, °API	26.4	26.3	26.8	23	26.1	22.1
Viscosity of oil, cp.	41 at 100° F.	43.5 at 100° F.	41.8 at 100° F.	176 at 60° F.	34.7 at 100° F.	63.7 at 100° F.



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by electrically operated pumping units.

... Water treatment. An old oil well, deepened to the Arbuckle formation at 1,008 ft., supplies water for flooding. A closed system was used initially, but it was abandoned in favor of the present open system. The water from the supply well is mixed with brine from the tank battery in a settling pond of about 100-bbl. capacity. The mixed waters are siphoned from this pond to a larger settling pond. Water leaving the second pond is treated with chemicals and filtered before being picked up by the injection pump. A plant pressure of 540 psi. is maintained, and injection rates and pressures are controlled at the individual wellheads.

... Flood results. Through June 1957, a total of 136,800 bbl. of oil had been produced, and 1,700,000 bbl. of water had been injected. This recovery is equivalent to 196 bbl. per acre-foot, which is considered good even for less-viscous oils. Conservative extrapolation of the production decline curve shows an ultimate recovery exceeding 200,000 bbl. of oil for the property.

Susimo Oil Co., Remlinger Project, Neosho Falls Field, Woodson County, Kansas

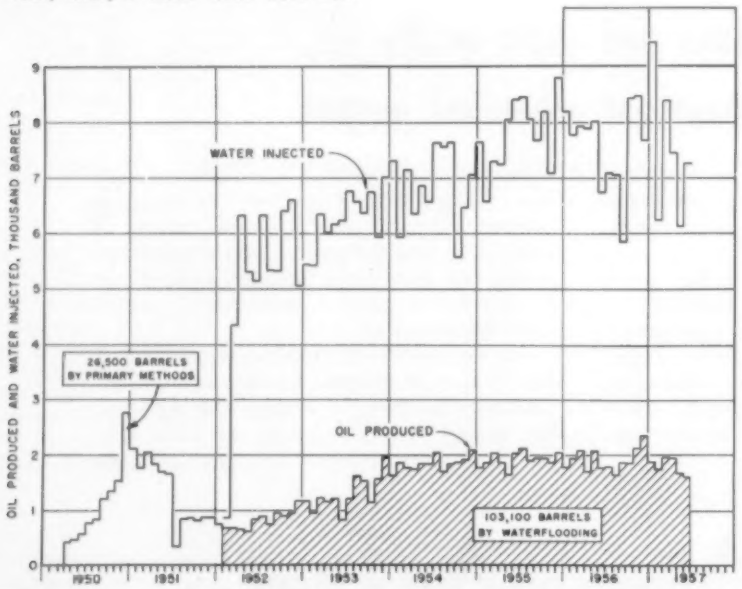
Original development of these properties was begun in April 1950. Thirty-one wells were drilled and produced by primary methods until the start of water flooding in February 1952.

At the start of water flooding, 20 oil wells were converted to water input wells; later, 3 other wells were converted. In converting the wells, the casing was pulled, the holes were cleaned and swabbed, and rag packers on 2-in. plain tubing were set and cemented at the top of the oil sand. Meters and control valves were installed at the wellheads to control water-input rates. A maximum injection rate of 2½ bbl. of water per foot of sand was used. Injection pressures ranged from 200 to 340 psi. at the wellhead.

... Water treatment. Two wells completed in the Kansas City limestone at a depth of 250 ft. supply brine for the flood. The water is pumped into a covered 400-bbl. wooden tank for storage. An oil seal minimizes the absorption of oxygen by the water. Produced brine from the oil wells is pumped into this tank also, where it is mixed with the brine from the water wells.

... Flood results. Since the start of water flooding, more than 103,000 bbl. of oil has been produced. This represents about 19% of the oil in place at the start of water flooding, according to core-analysis data. A total of 444,000 bbl. of water has been injected, for a water injected-oil produced ratio of 4.3 : 1. This exceptionally good ratio is the result of careful control of injection rates and pressures.

The produced water-oil ratio is increasing, showing that some permeable sand sections have been watered out. Selective plugging of these permeable sections might increase the flooding efficiency, and result in additional oil recovery.



PRODUCTION AND INJECTION HISTORY of the Susimo Oil Co. Remlinger project. Water flooding in this field has prevented early abandonment.

Texas-Western Co., North Lease Block Project, Allen County, Kansas

This flood started in 1955 as a 5-acre pilot test and has been expanded to a full-scale flood covering more than 25 acres. The field was originally developed in 1915 and 1916 with 10 completed oil wells. Production data from the primary production period are not available. Five of the original wells were cleaned out and used as producing wells when the flood was started in 1955.

The input wells were completed with 4-in. pipe set at the top of the sand and cemented to the surface. They were shot with about 2 qt. of nitroglycerin per foot of pay sand.

... Water treatment. A well completed in the Arbuckle limestone at a depth of 1,028 ft. supplies water for flooding. Water is pumped directly to the input wells through a closed system without filtration or chemical treatment. An open-type water-treating plant is under construction, however.

Original water-injection rate was 2 bbl. per ft. of oil sand penetrated, but was reduced to 1 bbl. per ft. when some degree of fillup was noted. Wellhead pressures range from 40 to 60 psi.

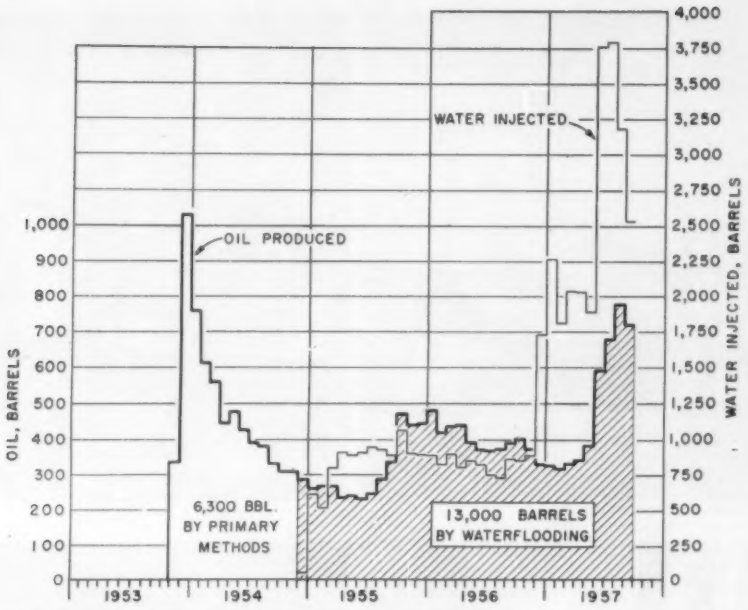
... Flood results. Mechanical difficulties in the pumping system have prevented the production from being maintained at a level consistent with the potential of the field. To November 1, 1957, a total of 3,080 bbl. of oil had been produced and 40,038 bbl. of water had been injected. Installation of new pumping facilities and the new water system is expected to increase the production rate, and improve the over-all operation of the flood.

Veeder Supply & Development Co., Brown-Wilmoth Project, Edna Field, Labette County, Kansas

The discovery well in this field was drilled in 1953. The producing formation is of the "shoestring" type, and there has been little exploratory drilling to develop the producing area. Only 12 wells have been drilled in the area; 5 oil wells, 4 water-injection wells, 1 water-supply well, and 2 dry holes.

The oil wells were completed with 4-in. pipe set and cemented at the top of the oil sand. The formation was hydraulically fractured using 150 to 200 bbl. of oil and 5,000 to 7,000 lb. of sand in each well. Production is by pumping through 2-in. tubing.

The injection wells were completed similarly, except they were shot with



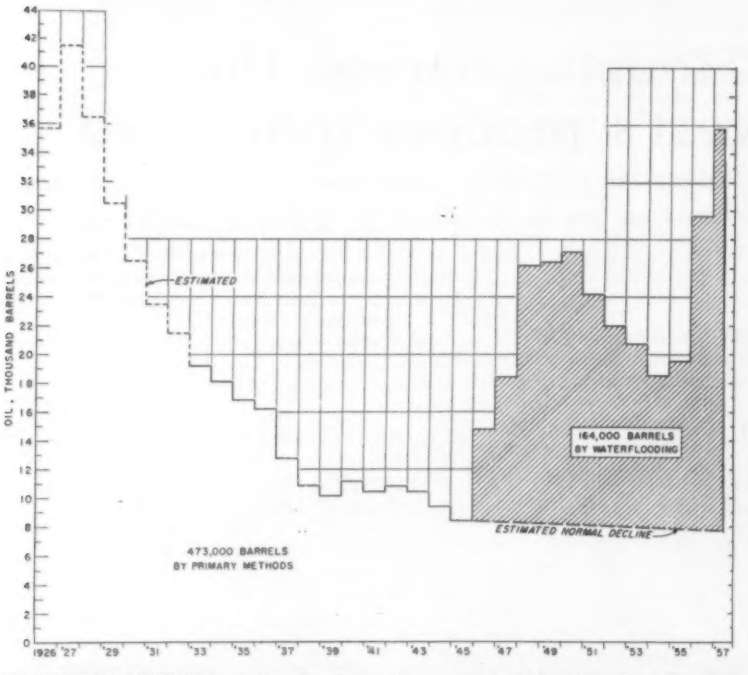
PRODUCTION AND INJECTION HISTORY of Veeder Supply & Development Co.'s Brown-Wilmoth project. Rapid decline in oil production was arrested 6 months after injection started.

20 qt. of nitroglycerin instead of the fracture treatment.

... Water treatment. The Arbuckle formation at a depth of 1,026 ft. supplies the injection water through one supply well. The system is closed and there is no filtration or chemical treatment except for a daily injection of 1 pt. of corrosion inhibitor into the supply well.

The rate of injection and the injection pressure can be controlled by the speed and stroke of the pumping unit on the supply well and by valves at each input wellhead.

... Flood results. Oil-production rate responded almost immediately to the injection of water. To October 1, 1957, a total of 44,000 bbl. of water had been injected and more than 13,000 bbl. of oil produced since the flood was started. The results are favorable so far, and the cost of operation has been low.



PRODUCTION HISTORY of Big Sandy project, operated by Woodson Pipeline and Producing Co. Increased production rate in 1945 led to the discovery of an accidental flood through casing leaks in abandoned wells.

Woodson Pipeline & Producing Co., Big Sandy Project, Big Sandy Field, Woodson County, Kansas

This field was flooded through casing leaks in abandoned wells. The field was originally drilled in 1926, and early wells produced as much as 300 bbl. daily. Lack of marketing facilities led to early abandonment of about half of the producing wells.

In 1945 an increase was noted in the producing rate of 17 wells. The casing in some of the older wells was tested and a leak discovered that was causing accidental flooding. The wells were reworked and completed as oil wells, and four additional wells were drilled in 1956. These were drilled primarily to locate the flood front. One old well was recompleted to serve as a water-disposal well for the produced brine.

... Water treatment. Only produced brine is being injected at the present time. It is skimmed to remove all traces of oil and flows by gravity to the input well. A water-supply well is staked out and several tanks have been set for the construction of a water-conditioning system.

... Flood results. Complete evaluation of this flood is impossible because it is not known how much water was injected during the life of the accidental flood. The produced brine that has been injected totals 13,000 bbl. and the production rate is still increasing. It is estimated that between 2.5 and 3.0 million barrels of oil will be produced from this field as a result of the water flooding now under way.

BOOK

FLUID DYNAMICS AND HEAT TRANSFER. By James G. Knudsen and Donald L. Katz. Published by McGraw-Hill Book Co., Inc., 330 West Forty-second Street, New York 36. $12.50. 576 pp.

Basics of fluid dynamics, necessary to understanding of convection heat transfer, are given here. This is intended as a one-semester graduate text bringing together theoretical aspects and quantitative data on heat transfer and fluid dynamics.

Eleven chapters deal with principles of various types of fluid flow; nonviscous and viscous fluids are dealt with in these chapters. The concluding six chapters deal with different aspects of forced-convection heat transfer.

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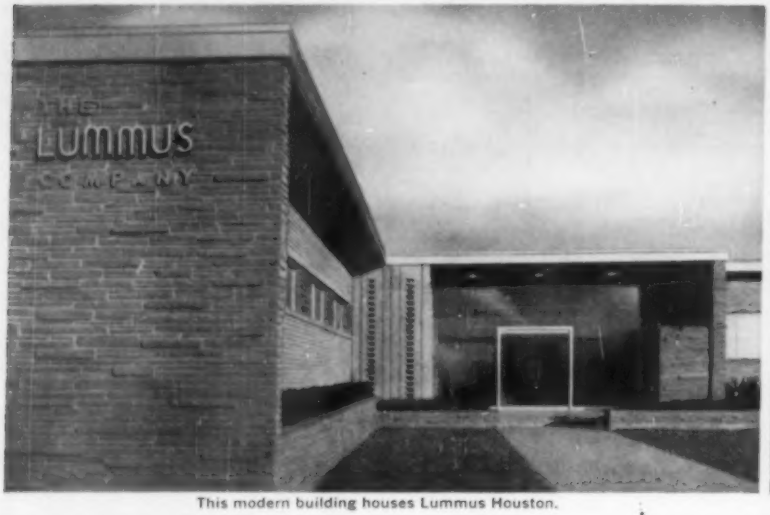

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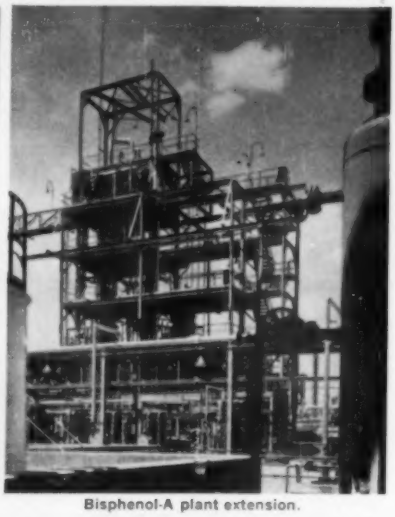
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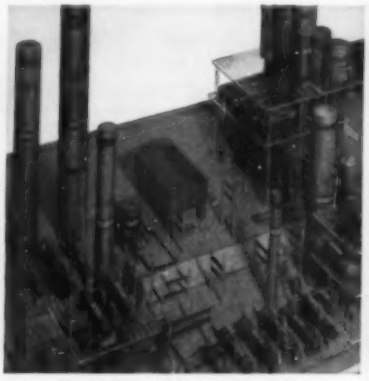
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Here's what you need to know about

Pipe, valves, and fittings

FOR a given pipe size, the outside diameter of all weights of pipe is the same dimension.

Steel pipes are joined together by threaded joints, flanged joints, and welded joints. Threaded joints are most frequently confined to the small pipe sizes; however, many older tank field lines are constructed with threaded connections.

Flanged connections are considered good construction for joining pipe, fittings, valves, and equipment in any of the strength classifications from cast iron to alloy steels.

Cast-iron flanges are made in 125 and 250 psi. ratings. The flanges are made with flat faces and require full-face gaskets because of the brittleness of cast iron. The drilling of 125-psi. cast iron is identical to the drilling of 150-psi. steel flanges and the 250-psi. cast iron drilling is identical to 300-psi. steel-flange drilling.

Steel flanges are made in several designs but the most frequently used face design is the 1/16-in. raised face, scored like a phonograph record and extending only over the center area of the flange and not as far out as the bolt holes. Another type of flange face which is used for higher-temperature and pressure services than the raised-face flange is the ring-joint flange. This joint is made up with a metallic ring which fits into deep grooves of the adjoining flange faces.

Where 1/16-in. raised-face flanges are used, a gasket is necessary. The most commonly used gasket is a nonmetallic type with an asbestos composition.

Flanges and flanged valves and fittings are available in all pressure ratings from 150 to 1,500 psi. Some standards provide a limit to the use of raised face flanges to a maximum pressure of 600 psi. and a maximum temperature of 600° F. Piping in services above 600 psi. pressure or 600° F. temperature require ring-joint-flanged construction. Special materials such as ammonia and Dowtherm require ring-joint-flanged piping for all temperatures and pressures.

This material taken from process-training-program manual, Baton Rouge, La., refinery of Esso Standard Oil Co.

Valves, like fittings, are made of cast iron, brass, steel, or alloys and have allowable working pressures according to the body and flange design at the material from which they are manufactured. Valves are made in different designs in each pressure classification to meet certain requirements in service.

A gate valve has a wider opening through the valve than any other type of valve and thus offers the least obstruction to flow. This valve will sometimes collect foreign materials between the valve seats and the gate, thus preventing a positive shutoff.

A globe valve operates by lowering a plug into a circular seat and is primarily used to control flow of a fluid. The design greatly restricts the flow of the fluid. These valves are used most frequently in smaller sizes where hand control may be required in a bypass line when a regular control valve is out of order.

A plug valve frequently called a cock is constructed with a hole through the plug and thus can be moved from a fully closed position to a fully opened position by a 90° turn of the plug. This valve has the advantage of quick opening or closing. It may require regular greasing for free and easy workability. Dry or corrosive deposits make greasing a necessity in order to move the plug at all. Special makes of plug valves are in limited use.

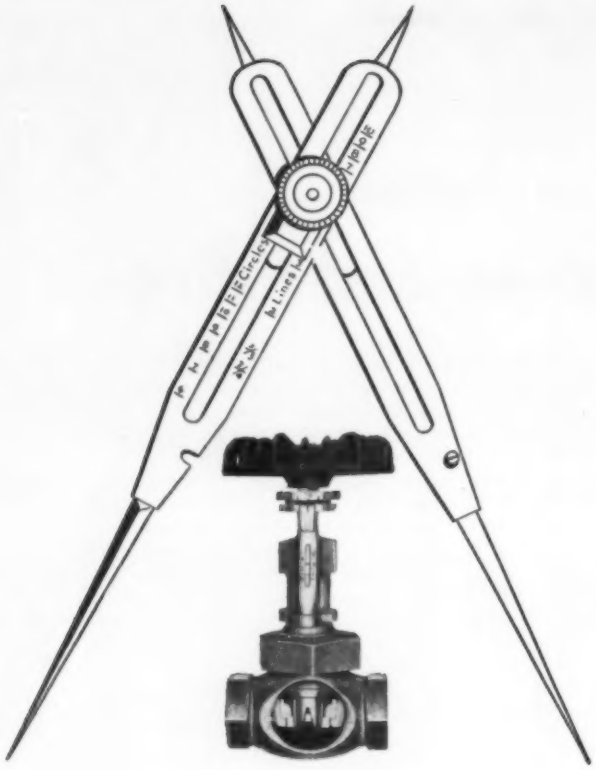
The Hamer plug valve has a separate handle socket for raising the plug to loosen it from its seat. The handle is then placed into another socket to turn the plug. After turning, the handle is returned to the first socket to place the plug firmly into its seat again. These valves are fairly successful for limited use and can be used with less grease than most ordinary plug valves. Another special type of plug valve is the wedge plug valve. This is similar to the Hamer in principle in that the plug lifts out of the seat and after turning is returned to its seat. With this valve the up-and-down movement of the plug works by a pin in the plug which follows a cam as the plug is moved through its 90° operation. This valve has found a special application in catalytic cracking unit slurry-oil service and has worked very satisfactorily. When tested in a very corrosive service, however, this valve did not show any advantages over the conventional plug valves.

In small valve sizes another special valve known as a needle valve is used for very fine throttling. These valves are made similar to globe valves but have very small and pointed plugs. Globe and needle valves work best when installed so that the direction of flow causes pressure against the bottom of the plug.

Forged-steel valves and fittings have higher pressure ratings and are most popular in pipe sizes of 1½ in. and smaller. Forged-steel gate and globe valves with 600-psi. rating are very widely used. Also forged-steel screwed fittings in the 1½-in. and smaller sizes are very popular in the 2,000, 3,000, and 6,000-psi. classes.

Flanges in all sizes are made from forged carbon steel, although flanged fittings, valve bodies, etc., are normally made of cast steel.

Welding ells, tees, reducers, etc., are made in sizes and strengths of standard pipe, extra-strong pipe, and double extra-strong pipe. The welding fittings are seamless and give full strength of the pipe itself. This type of construction is cheaper and frequently safer than flanged construction. The main disadvantage to a completely welded system is that the pipe is inaccessible to inspection, cleaning, and sometimes very difficult to gas free for maintenance work.



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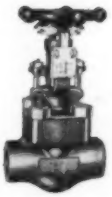
Hancock "Flocontrol" Valves are available in Bronze and Steel to meet the most demanding services. Ask your industrial supply distributor for details.



Hancock "Flocontrol" valves assure positive pinpoint control—eliminate all guesswork.

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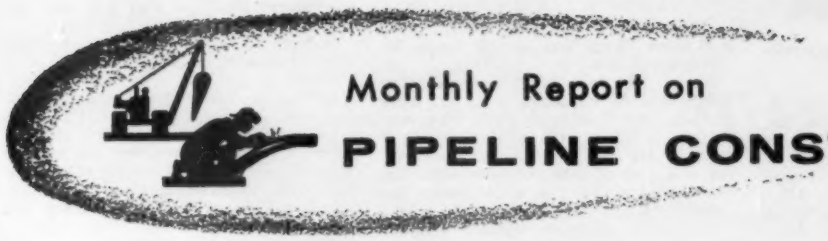

Monthly Report on PIPELINE CONSTRUCTION

PIPELINE ACTIVITY reported here is compiled from surveys by The Oil and Gas Journal among pipeline companies and construction contractors.

This summary report appears in the last issue of the Journal each month. New construction projects are reported weekly in Pipeline Briefs in the Journal's news section.

Projects are listed in three groups —U. S., Canadian, and Foreign— and according to type of line—crude, products, or natural gas.

U. S. Crude Oil Pipelines

• **Cameron Crude Oil Corp.,** Tulsa.
Project: 30 miles of 8-in. from Harper County, Okla., to Jayhawk Pipe Line, Harper Ranch, Kans., station.
Status: Planned.
Completion: Summer 1959.

• **Cape Pipe Line Co.** (Sun Oil Co., Cities Service Co., Atlantic Refining Co.), Philadelphia.
Project: Line from lower Delaware Bay to Philadelphia.
Status: Planned.
Completion: 1960.

• **Gillette Pipeline, Inc.,** and **A. W. Hartwig, Inc.**
Project: A 102-mile line from Dead Horse Creek field to Casper, Wyo.
Status: Pending Wyoming Public Service Commission approval.

• **Great Northern Railway Co.**
Project: 400 to 600 miles of 12 to 20-in. from Williston basin in Mont. and N. D., to Clearbrook or St. Paul, Minn.
Contractor: **Pipe Line Technologists, Inc.,** Houston, has completed feasibility study.

• **Husky Oil Co.,** Cody, Wyo.
Project: Gathering lines to the refinery at Cody.
Status: Planned.

• **International Oil Pipeline Corp.,** New York City.
Project: Would own U. S. section of 1,500-mile, 30-in. line proposed by Mid-Continent Pipe Lines, Ltd., from Edmonton, Alta., to Chicago. (See Canadian Crude-Oil Pipelines).
Status: Pending Canadian Board of Transport Commission approval.

• **Mid-Continent Pipe Line Co.,** Tulsa.
Project: Lines in Okla.: 3 miles of 10-in. from Duncan to Velma; 6 miles of 8-in. from Cromwell to Tiger Creek Junction; 5 miles of 6-in. from Key West to Beggs, 12 miles of 8-in. from Drumright to Tulsa; 7 miles of 4-in. from Key West to Davenport.
Status: Planned.
Completion: 1959.

• **Service Pipe Line Co.,** Tulsa, Okla.
Project: 9 miles of 10-in. from Snyder to Colorado City, Tex.
Status: Planned.
Completion: November 1959.

• **Teton Pipeline Co.,** Denver.
Project: 8 miles of 5-in. to connect O'Brien field, Carbon Co., Wyo., with the Sinclair Pipe Line system.
Status: Planned.

U. S. Products Pipelines

• **Buckeye Pipe Line Co.,** N. Y. C.
Project: 70 miles of 8-in. from Wayne to Flint, Mich.
Status: Planned.
Completion: Mid-1959.
Project: 11 miles of 6 in. from Syracuse-Utica line to Griffiss AFB, Rome, N. Y.
Status: Under way.
Contractor: **Sheehan Pipe Line Construction Co.,** Tulsa.
Completion: Spring 1959.

• **Everglades Pipe Line Co.**
Project: 35 miles of 10-in. from Port Everglades, Fla., to Miami's International Airport.
Status: Under way.
Contractor: **Latex Construction Co. of Georgia,** Atlanta.
Completion: Spring 1959.

• **Husky Oil Co.,** Cody, Wyo.
Project: Line from Cody to the Yellowstone products line west from Billings, Mont.
Status: Planned.

• **Katy and New York Central Railroads.**
Project: 2,500 miles of 10-in. and smaller LPG line from Houston through Kansas City, St. Louis, Indianapolis, and Cleveland to Syracuse, then down to New York City. A branch would go through Chicago to Detroit.
Status: Proposed.
Contractor: **Williams Brothers Co.,** Tulsa, has completed feasibility study.
Completion: November 1, 1959.

• **Phillips Petroleum Co.,** Bartlesville, Okla.
Project: 34 miles of 3-in. in Borger, Tex., area.
Status: Planned.
Completion: 1959.
Project: 54 miles of 3-in. natural-gasoline line from Crane County gasoline plant to Fort Stockton, Tex.
Status: Under way.
Contractor: **Conner Construction Co.,** Odessa, Tex.
Completion: Spring 1959.

• **Texas Eastern Transmission Corp.,** Little Big Inch Division, Houston.
Project: 63 miles of 8-in. from Tyler to Carthage, Tex.
Status: Under way.
Contractor: **O. R. Burden Construction Corp.,** Tulsa.
Completion: Summer 1959.

U. S. Natural Gas Pipelines

• **Arkansas Industrial Pipeline Corp.** (Arkansas Louisiana Gas Co.), Shreveport, La.
Project: 130 miles of 18-in. from Perla to Helena, Ark.
Status: Planned.
Completion: 1959.

• **Arkansas Louisiana Gas Co.,** Shreveport, La.
Project: A 300-mile line, plus gathering lines, from Tex.-La. coastal area to northern La., to connect with present system.
Status: Proposed.
Project: 100 miles of 16-in. from Clarksville to Perla, Ark.
Status: Under way.
Contractor: Company forces.
Completion: 1959.

• **Central Hudson Gas & Electric Corp.,** Poughkeepsie, N. Y.
Project: 13 miles of 10-in. from Highland to Kingston (Part II), N. Y.
Status: Planned.
Completion: 1960.

• **Chicago District Pipeline Co.**
Project: 50 miles of 36-in. from Joliet to Chicago.
Status: Pending FPC approval.
Completion: Fall 1959.

• **Coastal Transmission Corp.,** Houston.
Project: 147 miles of 20-in. from Robstown to Bay City, Tex.; 68 miles of 22-in. from Bay City to Galveston Bay, Tex.; 252 miles of 24-in. from Galveston Bay to Baton Rouge, La.
Status: Under way.
Contractor: **Oklahoma Contracting Co.,** Dallas, has 130 miles of 24-in. from Baton Rouge to Lake Charles, La., Leamon Creech, supt., office at Port Barre, La., and 147 miles of 20-in. from Robstown to Bay City, Tex., Ed Peters, supt., office at Robstown. **Brown & Root, Inc.,** Houston, has 11 miles of 24-in. across Galveston Bay. **River Construction Co.,** Fort Worth, has 105 miles of 24-in. from Galveston Bay to north of Lake Charles, La., to complete May 1, 1959, T. M. Tatom, spread supt. **Buddy Sherrod, Inc.,** Conroe, Tex., has the Natchez River crossing between Beaumont and Port Arthur, Tex. **Panama-Williams,** Houston, has 63 miles of 22-in. between Bay City, Tex., and Galveston Bay.
Completion: May 1, 1959.
Project: 320 miles of 3 to 14-in. gathering lines at various locations on Tex. and La. Gulf Coast.
Contractor: **Barry Construction Co.,** Pearland, Tex., has 63 miles of 3 to 8-in.
Completion: April 1959.

• **Colorado Interstate Gas Co.,** Colorado Springs, Colo.
Project: 109 miles of 26-in. from Four-Way station in Tex. Panhandle, to Morton Junction in southeastern Colo.; 135 miles of 34-in. from there to Pueblo, and 100 miles of 30-in. on to Denver; 148 miles of 34-in. from CIG line at Rock Springs, Wyo., to Provo, Utah, to connect with proposed El Paso Natural Gas Co.'s line to Calif.
Status: Planned.
Completion: January 1, 1960.

• **Colorado Oil & Gas Corp.,** Denver.
Project: 402-mile line from Gubik field to Fairbanks, Alaska.
Status: Proposed.

• **Columbia Gulf Transmission Co.,** Houston.
Project: 11 miles supply line connecting Block 17 field, East Cameron area, La.
Status: Approved.
Project: 10 miles of 12-in. supply loop to Erath field, Vermilion Parish, La., and

PIPELINE CONSTRUCTION

9 miles of various-size field lines in Acadia and Vermilion parishes, La.
Status: Approved.
Project: 10 miles of 20-in. loop in **Jefferson Davis and Vermilion parishes, La.,** and 3 miles of 6-in. loop in **Cameron Parish, La.**
Status: Has temporary FPC approval.

- **Consumers Power Co.,** Jackson, Mich.
Project: 40 miles of 24-in. from Woodbury station to Laingsburg Junction, Mich.
Status: Planned.
Completion: July 15, 1959.
Project: 120 miles of 26-in. from Mich.-Ind. border connection with Trunkline Gas Co., to Plymouth, Mich., and 20 miles of 24-in. from Northville to Clarkston, Mich.
Status: Planned.
Completion: September 1, 1959.
- **El Paso Natural Gas Co.,** El Paso, Tex.
Project: 51 miles of 20-in. from Terrell to Puckett, Tex., and 34 miles of 20-in. from Puckett tie-in to Goldsmith, Tex.
Status: Planned.
Project: 119 miles of 30-in. Permian-San Juan Line loops.
Status: Planned.
Completion: November 1959.
Project: 87 miles of gathering lines in Bisti field in San Juan Co., N. M.
Status: Has temporary FPC approval.
Project: 62-mile gathering system of 4½-10-in. in Beaver County, Okla.
Status: Pending FPC approval.
Completion: Fall 1959.
Project: 400 miles of 34-in. from **Salt Lake City,** to Calif. border near **Las Vegas, Nev.**
Completion: January 1960.
- **Gulf Resources, Inc.,** New York.
Project: 136 miles of 14 and 20-in. from Hidalgo County to LaSalle County, Texas.
Status: Pending FPC approval.
- **Houston Texas Gas & Oil Corp., St.** Petersburg, Fla.
Project: 679 miles of 24-in. from Baton Rouge, La., to Kissimmee, Fla.; 138 miles of 18-in. and 97 miles of 20-in. from Kissimmee to Cutler, Fla.; 702 miles of 3 through 18-in. sales laterals in Fla. Main line will join Coastal Transmission's line from McAllen, Tex., to Baton Rouge, La.
Status: Under way.
Contractor: **Midwestern-Waico Contractors,** St. Petersburg, Fla., has the 24-in. with spread offices at Denham Springs, La., Lacedale, Miss., and Vernon, Fla. **Harbert Construction Corp.,** Birmingham, has remainder, of which 150 miles of 3 to 16-in. Fla. laterals have been subcontracted to **Mid-States Construction Corp.,** Mt. Vernon, Ill.
Completion: June 1959.
- **Humble Oil & Refining Co.,** Houston.
Project: 238 miles of 30-in. from King Ranch plant to Clear Lake plant near Houston.
Status: Under way.
Contractor: **Panama, Inc.,** Houston.
Completion: January 1, 1960.
- **Iron Ranges Natural Gas Co., St. Paul.**
Project: 79 miles of 10 and 12-in. from Grand Rapids to Hoyt Lake, Minn., and 67 miles of 12-in. from Duluth to Silver Bay, Minn.
Status: Pending FPC approval.
Completion: Fall 1959.
- **Kansas-Nebraska Natural Gas Co., Inc.,** Phillipsburg, Kans.
Project: 15.5 miles of 12-in. loop in western Kansas.
Status: Pending FPC approval.
Completion: Fall 1959.
- **Manufacturers Light & Heat Co.**
Project: 61 miles of 20-in. (to replace 135 miles of old 6-in.).
Status: Pending FPC approval.
Completion: Fall 1959.
- **Michigan Consolidated Gas Co.,** Detroit.
Project: 53 miles of 30-in. from near Milford to Elsie in Clinton County, Mich.
Status: Planned.
Completion: Fall 1959.
Project: 67 miles of 10, 12-in. between Sears and Traverse City, Mich.
Status: Under way.
Contractor: **Somerville Construction,** Ada, Mich., **Floyd Huduall,** supt., office at Cadillac, Mich.
Project: 60 miles of 10, 12-in. between Muskegon and Ludington, Mich.
Status: Under way.
Contractor: **Somerville Construction Co.,** Ada, Mich., jointly with **H. L. Gentry Construction Co.,** Jackson, Mich., Frank Morris, supt., office at Hart, Mich.
- **Michigan Wisconsin Pipe Line Co.,** Detroit.
Project: 374.1 miles of 24-in. main line loop; 21 miles of 16-in. loop in Wis.
Status: Under way.
Contractor: **R. H. Fulton & Co.,** Lubbock, Tex., has six loops totaling 211.7 miles in Kansas, Nebraska, and Missouri; **Panama-Williams Corp.,** Houston, has two loops in Iowa and one in Illinois totaling 124.2 miles; **Somerville Construction Co.,** Ada, Mich., has two loops in Michigan totaling 38.2 miles.
Completion: July 1, 1959.
- **Midwestern Gas Transmission Co.,** Houston.
Project: 350 miles of 30-in. from Portland, Tenn., to Joliet, Ill.
Status: Pending FPC approval.
Completion: Planned for 1959.
- **Mississippi River Transmission Corp.** (Mississippi River Fuel Corp.), St. Louis.
Project: 115 miles of 24-in. from near Oran in southeast Mo., north between Ste. Genevieve and Bonne Terre into vicinity of Herculaneum and Pevely then into St. Louis Co.
Status: Planned.
Completion: Last half 1960.
- **Mountain Fuel Supply Co.,** Rock Springs, Wyo.
Project: 5 miles of 8-in. and 1 mile of 6-in. south of **Rock Springs,** Wyo.
Status: Planned.
Completion: July 1959.
- **New York State Natural Gas Corp.,** Pittsburgh.
Project: 43 miles of 20-in. from Kittanning to Luthersburg, Pa.
Project: 14.5 miles of 26-in. from Chatham Township to Lawrenceville, Pa.
Status: Planned.
Completion: 1959.
Project: 20 miles of 20-in. in Tioga County, Pa., and 18 miles of takeup.
Status: Under way.
Contractor: **Williams Brothers Co.,** Tulsa.
Completion: June 1, 1959.
- **Niagara Mohawk Power Corp.,** Syracuse, N. Y.
Project: 100 miles of 12-in. from Watertown to Massena, N. Y.
Status: Planned.
Contractor: **Fulghum Contracting Corp.,** Harrisburg, Pa.
Completion: August 1, 1959.
Project: 26 miles of 12-in. from Volney to Ellisburg, N. Y.
Status: Under way.
Contractor: **Consolidated Gas & Service Co.,** Chicago.
Completion: May 1, 1959.
- **North Carolina Natural Gas Corp.,** Fayetteville, N. C.
Project: 730 miles of 2 to 16-in. from

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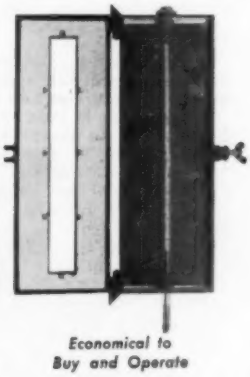

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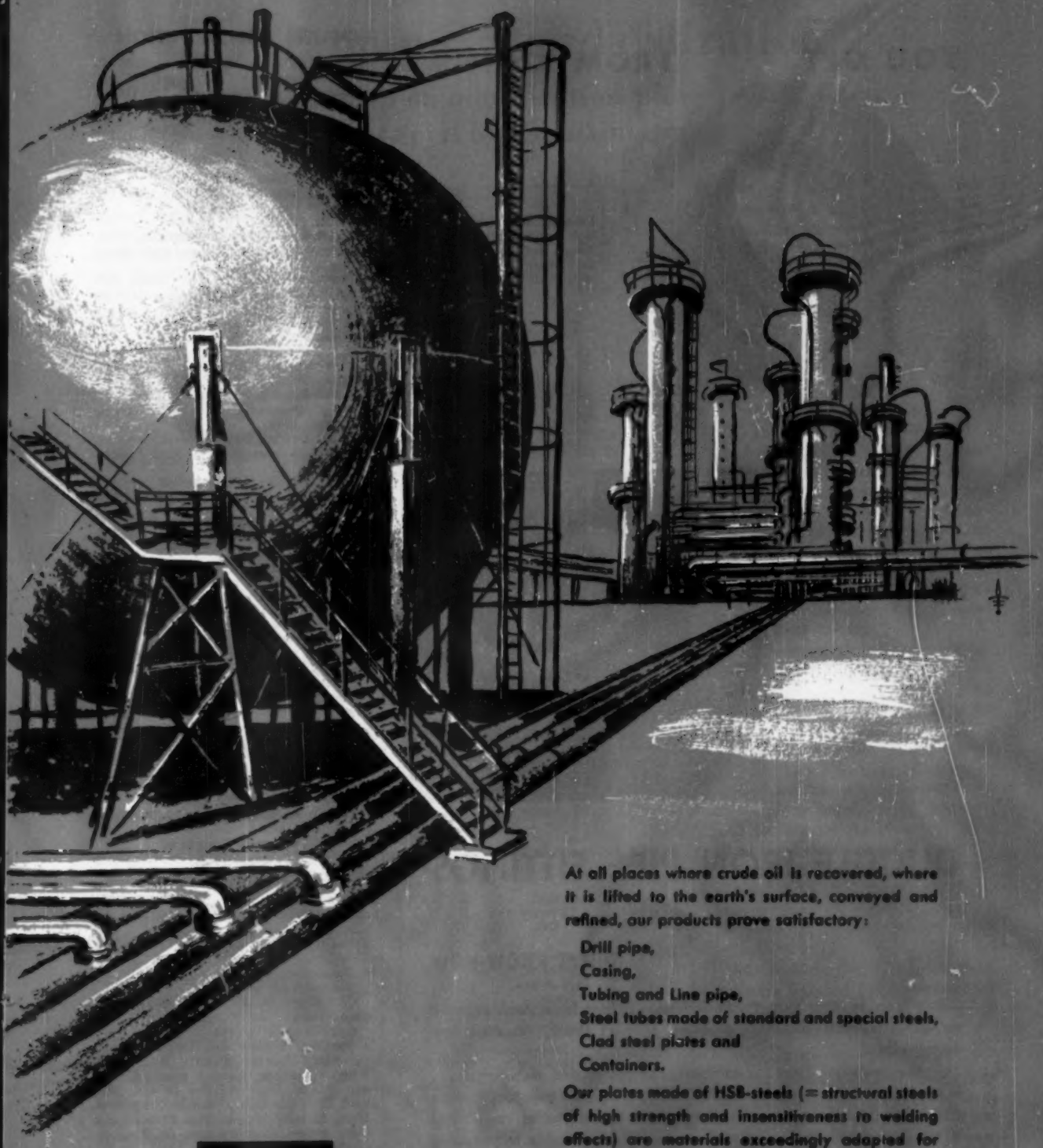

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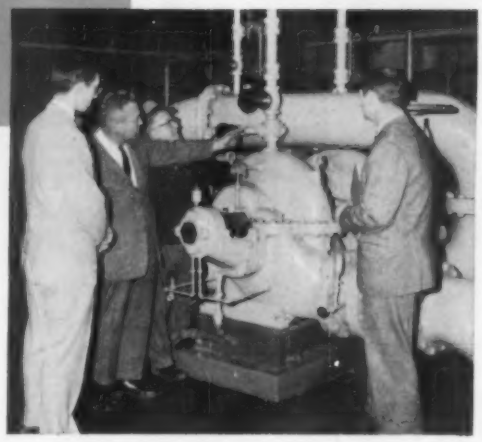

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PIPELINE CONSTRUCTION

near Mooresville, eastwardly across N. C.
Status: Under way.
Contractor: **J. P. Neill & Co., Inc.**, Dallas, 112 miles of 16-in.; **Somerville Construction Co.**, Ada, Mich., 386 miles of 2 to 12-in.; **C. N. Flagg & Co.**, Meriden, Conn., 102 miles of 3 to 6-in.
Completion: April 1, 1959.

• **Northern Illinois Gas Co.**
Project: 140 miles of 24-in. from Des Plaines to East Dubuque, Ill.
Status: Pending FPC approval.
Contractor: **Williams Brothers Co.**, Tulsa, has completed engineering and right-of-way studies.

• **Northern Natural Gas Co.**, Omaha, Neb.
Project: 217 miles of main line, 221 miles of main-line loops, 1,906 miles of branch lines of various diameters.
Status: Pending FPC approval.
Completion: 1959-61.
Project: 18 miles of 20-in. from Dubuque, Iowa, to Menominee, Ill.
Status: Pending FPC approval.
Project 19 miles of 30-in. from Oakland to Ogden, Iowa.
Status: Pending FPC approval.
Project: 9 miles of 30-in. from Palmyra to Beatrice, Neb.
Status: Pending FPC approval.
Project: 11 miles of 30-in. from Clifton to Tescott, Kans.
Status: Pending FPC approval.
Project: 8 miles of 30-in. from Tescott to Bushton, Kans.
Status: Pending FPC approval.
Project: 11 miles of 30-in. from Sunray, Tex., to Beaver, Okla.
Status: Pending FPC approval.
Contractor: **R. H. Fulton & Co.**, Lubbock, Tex.
Project: 8 miles of 30-in. from Beaver, Okla., to Mullinville, Kans.
Status: Pending FPC approval.
Contractor: **R. H. Fulton & Co.**, Lubbock, Tex.
Project: 169 miles of 20-in. from Farmington, Minn., to Superior, Wis.
Status: Pending FPC approval.
Project: 23 miles of 24-in. main line loop in Neb.
Status: Pending PFC approval.
Project: 44 miles of 16-in. in Duluth-Superior, Wis., area.
Status: Pending FPC approval.
Project: 57 miles of 30-in. main line loop in Iowa, Minn., Neb. and Kans.
Status: Pending FPC approval.
Project: 188 miles of 24-in. and 215 miles of 30-in. from Farmington, Minn., to International border.

• **Northern Oklahoma Gas Co.**, Ponca City.
Project: 75 miles of 12-in. from Cherokee to Ponca City, Okla.
Status: Under way.
Contractor: **O. R. Burden Construction Corp.**, Tulsa.
Completion: May 1959.

• **Northern Utilities Co.**, Casper, Wyo.
Project: 35 miles of 16-in. in Fremont-Natrona counties, Wyo.; 8 miles of 12-in. near Casper, Wyo.; 6 miles of 8-in. from Sand Draw gas field to Beaver Creek field, Wyo.; 12 miles of 6-in. from Beaver Creek field to the system servicing the Riverton-Lander, Wyo., area.
Status: Planned.

• **Offshore Gathering Corp.**, Houston.
Project: 364 miles in Gulf of Mexico off La.: 60 miles of 24-in., 70 miles of 26-in., and 234 miles of 30-in. dual line.
Status: Pending FPC approval.

• **Pacific Gas & Electric Co.**, San Francisco.
Project: 131 miles of 34-in. looping of Topock-Milpitas main line.
Status: Planned. Pending FPC approval.

Trapping Standardization

. . . steam trap standardization plus standardized hook-ups spell lower maintenance costs

An important weapon in the fight against rising maintenance costs is standardization. It can reduce the variety of maintenance problems and simplify those which remain.

Since we specialize in steam traps we'd like to offer some suggestions for a trapping standardization program. Such a program involves standardization on one make of trap and standardization of hook-ups.

Trap Standardization

The advantages of standardizing on a single make of trap are important and can make a big difference in the cost and ease of repairs because—

1. You can carry a more complete stock of repair parts with a smaller inventory.

2. Maintenance personnel has the opportunity to become expert on one make rather than be "jacks of all traps."

3. As an exclusive user of one make of traps you become a preferred customer of your trap representative and can be sure of getting the best possible service.

4. You can enjoy the advantages of standardized hook-ups.

Standardized Hook-ups

Standardized hook-ups facilitate and reduce the cost of both original installation and maintenance. By adopting standards for the dimensions of all fittings, including nipples, each hook-up for a given size of trap is identical and can be fabricated in the pipe shop.

Unions should be used so that when a trap needs repair, the unions can be uncoupled, the trap lifted from the line and a spare carrying identical length nipples and half unions slipped into place. In as little as a minute or two a faulty trap can be replaced. The faulty trap can go back to the storeroom for repair when convenient and then be put into stock as a spare.

Figure 1 shows a typical standardized hook-up used by a major chemical manufacturer. Note how

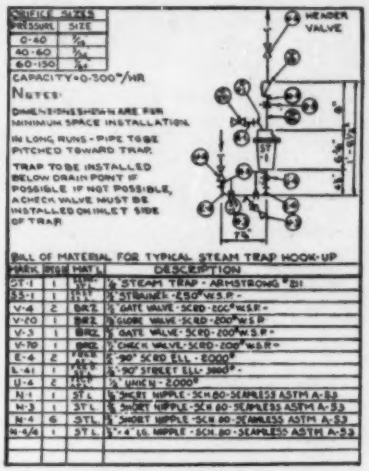

Fig. 1—Typical standardized installation hook-up used by a leading chemical manufacturer.

the hook-up provides the following advantages:

1. Test valve in trap cap permits fast, easy checking of trap operation.

2. Strainer ahead of trap protects it against dirt and scale.

3. Blowdown valve in strainer provides easy cleaning.

4. Check valve in discharge line isolates trap when test valve is opened.

5. Shut-off valves and unions ahead of and following trap permit removal of entire trap from line.

Fig. 2—Armstrong traps have only two moving parts—the lever assembly and the bucket. Nothing much to go wrong here.

Another important consideration for getting the most from a standardization program is accessibility of the traps. Insofar as is possible, traps should be located so that they are convenient for inspection. The easier it is to locate and get at a trap, the less likelihood that it will be overlooked.

What Make of Trap? (This is the Commercial)

Obviously, a trap standardization program shows the best results when the make of trap selected is the one that gives the best service. Naturally, we think the make should be Armstrong and fortunately a lot of trap users agree. Here are some of the advantages of standardizing on Armstrong that have been pointed out by these users:

1. *Armstrong traps work.* They don't leak steam and they do discharge condensate and air as fast as they reach the trap. And they work with any return system.

2. *Armstrong traps aren't "prima donnas."* They need no special care or coddling. Valve and seat are hardened chrome steel. Lever assembly and bucket are stainless steel and these are the only moving parts.

3. *Armstrong traps aren't "orphans."* You can *always* get parts and service from nearby Factory Representatives and stocking distributors.

4. *Armstrong traps are guaranteed.* If you're not *completely* satisfied you can return the traps for refund of purchase price.

More Information

The 44-page Steam Trap Book (free on request) gives a lot more facts on trap selection and installation. Call your local Armstrong Representative or write **Armstrong Machine Works, 8687 Maple St., Three Rivers, Michigan.**

ARMSTRONG STEAM TRAPS

PIPELINE CONSTRUCTION

Completion: 49 miles in 1959; 82 miles in 1960.

Project: 42 miles of 30-in. from Pittsburg to Irvington, Calif.

Status: Planned.

Completion: 11 miles in 1959; 31 miles in 1960.

Project: 296 miles of 36-in. from Klammath Falls, Ore., to Antioch, Calif.

Status: Pending Canadian export permit and FPC approval.

Completion: December 1960.

- **Pacific Gas Transmission Co.** (Pacific Gas & Electric, San Francisco).

Project: 614 miles of 36-in. from Kingsgate, B. C., to California border near Klammath Falls, Ore.

Status: Pending approval of FPC and Canadian authorities to import gas. To start late 1959.

- **Pacific Lighting Gas Supply Co.,** Los Angeles.

Project: 128 miles of 34-in. from Topock, Ariz., to Newberry, Calif.

Status: California Public Utilities Commission has granted certificate contingent upon FPC approval of Transwestern Pipeline Co.'s proposed project terminating at Topock, Ariz.

Completion: November 1, 1959.

- **Pacific Northwest Pipeline Corp.,** Salt Lake City.

Project: 17 miles of 30-in. loop of Spokane-Coeur d'Alene lateral.

Status: Pending FPC approval.

Completion: 1961.

- **Pennsylvania Gas Co.,** Warren, Pa.

Project: 23 miles of 10-in. in Erie Co., Pa., 15 miles of 8-in. in Warren and Chautauqua counties, Pa.; 30 miles of branch lines, and several small distribution lines.

Status: Approved.

- **Peoples Natural Gas Co.,** Pittsburgh.

Project: 30 miles of 20-in. from Bentleyville to Imperial, Pa.

Status: Planned.

Contractor: **Coates Field Service, Inc.,** Oklahoma City, has right-of-way acquisition.

Completion: September 1, 1959.

Project: 25 miles of 24-in. from Waynesburg, Pa., to W. Va. line near Garrison, Pa.

Status: Planned.

Completion: September 1, 1959.

Project: 14 miles of 12-in. from Johnstown to Seven Springs, Pa.

Status: Planned.

Completion: September 1, 1959.

- **Permian Basin Pipeline Co.,** Omaha, Neb.

Project: 65 miles of 16-in. from Hobbs, N. M., to Kermit, Tex.

Status: Under way.

Contractor: **R. H. Fulton & Co.,** Lubbock, Tex., has main line construction; **Pipecote Service Corp.,** Tulsa, has internal coating contract.

Completion: April 1959.

- **Piedmont Gas Co.,** Hickory, N. C.

Project: 78 miles of 2 to 8-in. extension off Transcontinental in N. C., to serve Gaston, Lincoln, Catawba, Caldwell, and Burke counties.

Status: Approved.

- **Pioneer Natural Gas Co.,** Amarillo Tex.

Project: 21 miles of 12-in. from Sudan to Muleshoe, Tex.

Status: Pending FPC approval.

Project: 12 miles of 10-in. from Muleshoe, Tex., northward.

Status: Pending FPC approval.

- **Rio Gas Gathering Co.,** San Antonio, Tex.

Project: 97 miles of 3 to 8-in. gathering line in Hidalgo County, Tex.

Status: Pending FPC approval.

Completion: 1959.

- **Signal Oil & Gas Co.,** Los Angeles.

Project: Extension of gathering system from Tioga, N. D., to near the Canadian border in Burke Co.

Status: Being considered.

- **Southern California Gas Co.** and **Southern Counties Gas Co.,** Los Angeles.

Project: 206 miles of 34-in. from Ivanpah Lake to Placentia, Calif.

Status: Planned.

Completion: December 1959.

- **Southern Counties Gas Co.,** Los Angeles.

Project: 13.5 miles of 30-in. from Santa Ana to Huntington Beach power plant.

Status: Under way.

Contractor: **Pacific Pipeline Co.,** Los Angeles.

Completion: May 1, 1959.

- **Southern Natural Gas Co.,** Birmingham, Ala.

Project: Supply lines in S. La.: 6 miles of 6-in. South Lake Long field lateral; 13 miles of 16-in. Barataria Line loop; 2 miles of 12-in. Coffee Bay field lateral.

Status: Pending FPC approval.

Completion: 1959.

Project: 79 miles of 16-in. from Ocmulgee to Wrens, Ga.; 22 miles of 14-in. from Griffin to Atlanta, Ga.

Status: Pending FPC approval.

Project: 80 miles of 18-in. between Cranfield and Gwinville, Miss.

Status: Pending FPC approval.

Completion: 1959.

Project: 11 miles of 24-in., Gwinville-Enterprise, Miss.; 9 miles of 24-in., Enterprise, Miss.-Gallion, Ala.; 26 miles of 24-in., Gallion-Elmore, Al.; 43 miles of 20-in., Elmore, Ala.-Ellerslie, Ga.; 23 miles of 20-in., Ellerslie-Ocmulgee, Ga.; 17 miles of 20-in., Olga-Toca, La.; 35 miles of 16-in.,

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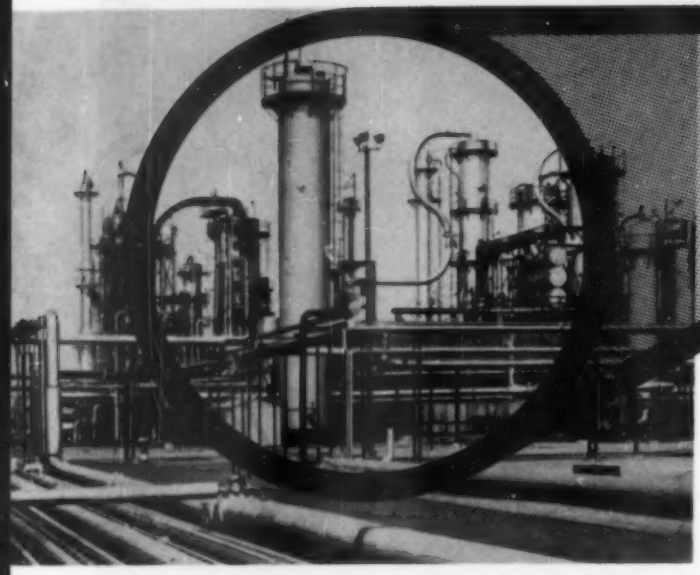

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PIPELINE CONSTRUCTION

Montegut-Gloria, La.
Status: Pending FPC approval.
Completion: 1959.

- **Southern Union Gas Co.** and **Southern Union Gathering Co.**, Dallas.

Project: 7 miles of 8-in., 4 miles of 10-in., 6 miles of 12-in. from Albuquerque, N. M., to Tijeras Canyon east of Albuquerque.
Status: Planned.
Completion: April 30, 1959.
Project: 11 miles of 8-in. from Atoka Penn field to Artesia Junction, N. M.
Status: Planned.
Completion: June 30, 1959.

- **South Georgia Natural Gas Co.**, Thomasville, Ga.

Project: Lines in Ga.: 2 miles of 2-in. near Meigs; 31 miles of 3-in. near Nashville; 41 miles of 4-in. and 39 miles of 6-in. near Tifton.
Status: Planned.
Completion: Summer 1959.

- **South Texas Natural Gas Gathering Co.** (Coastal States Gas Producing Co., Corpus Christi, Tex.)

Project: 57 miles of 20-in., 9 miles of 16-in., 21 miles of 14-in., 17 miles of 10-in., and 2 miles of 8-in., from Falfurrias to McAllen, Tex.
Status: Under way.
Contractor: **O. R. Burden Construction Corp.**, Tulsa.
Completion: Summer 1959.
Project: A 60-mile line from existing system to steam generating plant in Pearsall County, Tex.
Status: Planned.
Completion: January 1960.

- **Tennessee Gas Transmission Co.**, Houston.

Project: 21 miles of 16-in. and 2 miles of 12-in. to offshore La. fields.
Project: 158 miles of 36-in. loop in La. and Miss.
Status: Approved.
Completion: Planned for 1959.

- **Tensas Gas Gathering Corp.**

Project: 37 miles of 2 to 8-in. from Rodney field, Miss., westerly to connect with Olin Gas Transmission Co.'s line in Tensas Parish, La.
Status: Approved.

- **Texas Eastern Transmission Corp.**, Shreveport, La.

Project: 13 miles of 30-in. from Grennup Co., Ky., to Scioto Co., Ohio; 16 miles of 30-in. from Noble Co. to Monroe Co., Ohio.
Status: Pending FPC approval.
Completion: 1959.
Project: 13 miles of 30-in. in Bucks Co., Pa.; 81 miles of 24-in. from Leidy Storage field to Perulack Station, Pa.; 66 miles of 30-in. from Delmont, Pa., to Lambertville, N. Y.; 23 miles of 20-in. from Station 25 to Chester Junction, Pa.
Status: Pending FPC approval.
Completion: 1959.
Project: 40 miles of 36-in. from Station 26 to Station 27 in N. J., and 4 miles of 30-in. from Station 27, N. J., to Staten Island, N. Y.
Status: Pending FPC approval.
Completion: 1959.

- **Texas Gas Transmission Corp.**, Owensboro, Ky.

Project: 30-in. looping program: 50 miles near Alexandria, La.; 24 miles near Bastrop, La.; 9 miles near Greenville, Miss., 9 miles near Clarksdale, Miss.
Status: Approved. Under way.
Completion: 1959.
Contractor: **Houston Contracting Co.**, Houston, has completed 30 miles in vicinity of Pineville and Bastrop, La.
Project: 26-in. looping program: 9 miles near Hardinsburg, Ky.; 10 miles near Louisville, Ky.
Status: Approved.
Completion: 1959.
Project: 8 miles of 10-in. near Petersburg, Ind.; 5 miles of 16-in. near Dixie, Ky.; 2 miles of 6-in. near Linton, Ind.; 1 mile of 6-in. near Lawrenceville, Ill.
Status: Approved.
Completion: 1959.

- **Texas Illinois Natural Gas Pipeline Co.**, Chicago.

Project: 860 miles of 30-in. looping of present system.
Status: Planned.
Completion: 1960-1961.

- **Transcontinental Gas Pipe Line Corp.**, Houston.

Project: 57 miles of 30-in. main line loop in various states; 51 miles of 36-in. main line loop in various states; 219 miles of 36-in. main line loop in various states; 17 miles of 20-in. lateral; 52 miles of 10, 14-in. laterals in Tex. and La.; 51 miles of 24-in. and under in Tex. and La.
Status: 51 miles of 36-in. is approved and under way; 57 miles of 30-in. is deferred and planned; remainder is planned, pending FPC approval.
Contractor: **Sharman, Allen, Gay & Taylor, Inc.**, Houston; **H. C. Price Co.**, Bartlesville, Okla.; **Hallmac Construction Co.**, Houston; **Bechtel Corp.**, San Francisco, **J. P. Neill & Co., Inc.**, Dallas; **Panama-Williams Corp.**, Houston; **Brown & Root, Inc.**, Houston.
Completion: 1959.
Project: 15 miles of 16-in. and a shorter 12-in. line to Block 71 and Block 76 fields off Vermilion Parish, La.
Status: Has FPC examiner's approval.
Completion: 1959.

- **Transwestern Pipe Line Co.** (Warren Petroleum, Monterey Oil Co., J. R. Butler), Dallas.

Project: 635 miles of 24-in. from Perryton and Fort Stockton, Tex., to Roswell, N. M., and 670 miles of 30-in. from Roswell to Topock, Ariz.
Status: Pending FPC approval.
Completion: Mid-1959.

- **Trunkline Gas Co.**, Houston.

Project: 45 miles of 24-in. from Moss Hill to Silsbee, Tex.
Status: Planned. Pending FPC approval.
Completion: May 1959.
Project: 115 miles of 30-in. from Pitkin to Riverton, La.
Status: Planned. Pending FPC approval.
Completion: July 1959.
Project: 119 miles of 30-in. from Kilborne, La., to Ballentine, Miss.
Status: Planned. Pending FPC approval.
Completion: September 1959.
Project: 117 miles of 30-in. from Canadaville, Tenn., to Bardwell, Ky.
Status: Planned. Pending FPC approval.
Completion: August 1959.
Project: 113 miles of 30-in. from Marion to Neoga, Ill.
Status: Planned. Pending FPC approval.
Completion: September 1959.
Project: 204 miles of 26-in. from Bourbon, Ill., to Vistula, Ind.
Status: Planned. Pending FPC approval.
Completion: August 1959.
Project: 45 miles of 14-in. and 32 miles of 4 to 10-in. from Hitchcock to Katy, Tex.
Status: Planned. Pending FPC approval.
Completion: June 1959.
Project: 33 miles of 20-in., 32 miles of 16-in., 9 miles of 6-in. from Lowry, La., to Block 26.
Status: Planned. Pending FPC approval.
Completion: May 1959.
Project: 34 miles of 12-in. from Lowry, La., to Block 67.
Status: Planned. Pending FPC approval.
Completion: July 1959.

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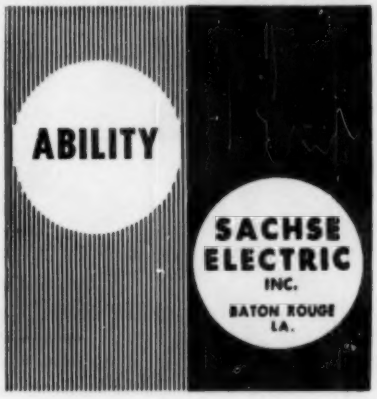

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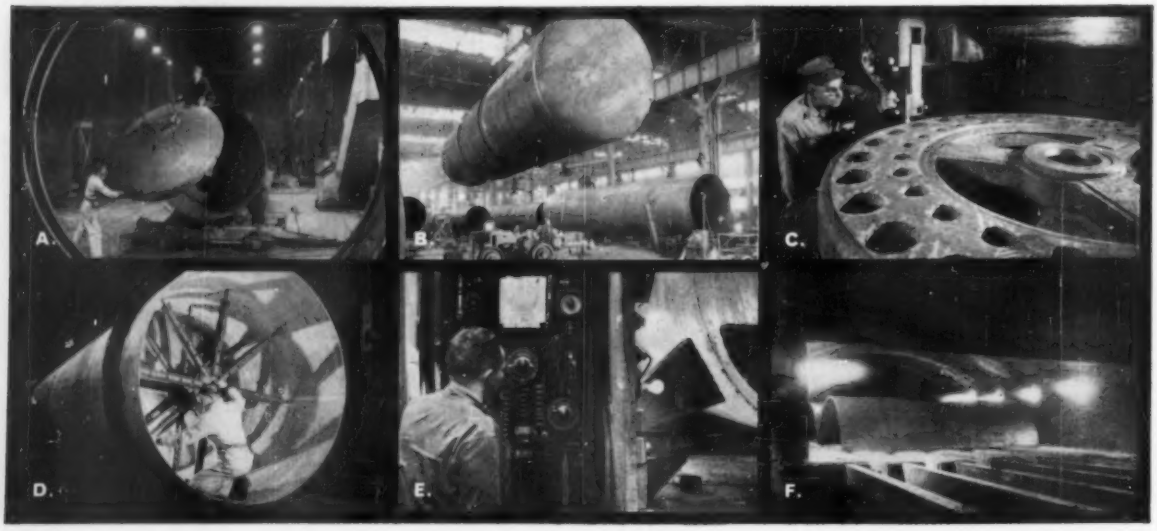

PIPELINE CONSTRUCTION

- **United Gas Pipe Line Co.**, Shreveport.
  Project: 41 miles of 30-in., 12 miles between Kiln and Gulfport, Miss., and 29 miles between Gulfport and Whistler Junction, Ala.
  Status: Under way.
  Contractor: **Houston Contracting Co.**
  Completion: Spring 1959.
  Project: 9 miles of 16-in. to connect gas supply in Belle Isle, S. La.
  Status: Pending FPC approval.
  Project: 10 miles of 16-in. to connect gas supply in Four Isle Dome field, S. La.
  Status: Pending FPC approval.
- **Valley Gas Transmission, Inc.** (Fish Engineering Corp.), Houston.
  Project: 150 to 160 miles of 3 to 6-in. gathering lines to tap fields in Starr, Hidalgo, Brooks, and Jim Wells counties, Tex.
  Status: Pending FPC approval.
  Completion: 1959.
- **Western Slope Gas Co.** (Public Service Co. of Colorado), Denver.
  Project: 2 miles of 8-in., 18 miles of 6-in., 13 miles of 4-in. extension of gathering facilities in Colorado.
  Status: Planned.
  Completion: 1959.

Canadian Crude Oil Pipelines

- **Act Oils, Ltd.**
  Project: A 450-mile line from the Peace River region of northern B. C. to tidewater at Kitimat, B. C.
  Status: Pending British Columbia Government approval.
- **B-A Alberta Pipe Line, Ltd.**, Calgary, Alta.
  Project: 35 miles of 8-in. to connect Drumheller field, Alta., with existing lines running to Edmonton.
  Status: Pending approval.
- **Bituminous Oil Pipeline Co.** (Royalite Oil Co., and Can-Amera Oilsands Development, Ltd.)
  Project: A 250-mile line from Athabasca oil sands in northeastern Alta., to Edmonton.
  Status: Proposed.
  Completion: 1960.
- **Independent Pipe Line Co.** (Home Oil Co.), Calgary.
  Project: 1,073 miles of 36-in. from Edmonton, Alta., to Superior, Wis.; 946 miles of 34-in. from Superior to Montreal, Que.; 72 miles of 16-in. and 74 miles of 10-in. feeder lines from Calgary to Bellshill Lake. Alta., on the 36-in. line.
  Status: Proposed.
- **Mid-Continent Pipe Lines, Ltd.**, Edmonton, Alta.
  Project: 1,500 miles of 30-in. from Edmonton to Chicago, via Sask., N. D., Minn., Wis., and Ill. U. S. section to be owned by International Oil Pipeline Corp., New York City.
  Status: Pending Canadian Board of Transport Commission approval. **W. C. Gilman & Co.**, New York City, has made preliminary study.
- **Peace River Oil Pipe Line Co., Ltd.**, Calgary, Alta.
  Project: 8 miles of 6-in., 45 miles of 8-in., and 17 miles of 12-in. from its Fox Creek Pump Station to Windfall, Virginia Hills, and Swan Hills fields in Alta.
  Status: Approved.
- **Trans-Prairie Pipelines, Ltd.**, Edmonton, Alta.
  Project: 6-8-in. line from Weyburn field to Regina and Moose Jaw, Sask.
  Status: Proposed.

Canadian Products Pipelines

- **Foothills Products Pipe Line, Ltd.** (Pembina Pipe Line Co., Mannix Co., Ltd.), Calgary, Alta.
  Project: Gathering system to connect Alta. gasoline plants to trunk line from Alta. to Pacific Coast.
  Status: Proposed.
- **Hydrocarbons Pipeline Co.**, Winnipeg, Man.
  Project: 800 miles of 6, 8-in. LPG line from near Edmonton to Fort William, Ont.
  Status: Has Parliament of Canada approval. Seeking approval of Federal Board of Transport Commissioners and the Alberta Petroleum and Natural Gas Conservation Board.
  Contractor: **Dutton - Williams Brothers, Ltd.**, Calgary, and **A. D. Little Co.**, Boston, are consultants.
- **Pembina Pipe Line, Ltd.**, Edmonton, Alta.
  Project: A 1,200-mile line to carry sulfur, LPG, and natural gasoline from Alta.'s gas fields to eastern Canada.
  Status: Proposed.

Canadian Natural Gas Pipelines

- **Alberta Gas Trunk Line Co., Ltd.**, Calgary.
  Project: 122 miles of 30-in. from Princess to Torrington, Alta.; 122 miles of 6 to 16-in. at various locations.
  Status: Planned.
  Completion: October 1959.
  Project: 256 miles of 36-in., 75 miles of 30-in., 55 miles of 26-in., 199 miles of various diameter gathering lines, and 42 miles of 16-in. delivery lateral.
  Status: Pending approval of Canadian and

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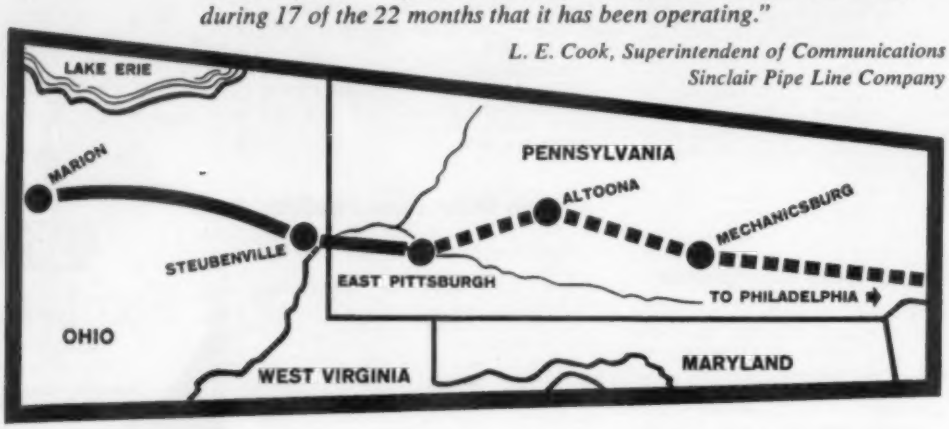

Only five outages in the 22 months of service this Kellogg PTM Microwave System has been in operation for Sinclair Pipe Line Company, and only two of these totalling 2 hours and 51 minutes caused by the microwave equipment. That's 99.998% reliability, far superior to physical circuits!

Sinclair's dual path system was inaugurated on October 13, 1956. The present system stretches 200 miles from Marion, Ohio, to East Pittsburgh, Pennsylvania. It features 8 channels, 2 terminal stations, and 7 repeaters. All intermediate stations have drop equipment. At East Pittsburgh, circuits are joined by similar Kellogg 10C PTM systems extending eastward to Mechanicsburg then to Philadelphia.

Sinclair's dual path operation between East Pittsburgh and Marion, Ohio has many advantages over conventional systems, principally the elimination of all switch-over equipments or circuits. A failure of one of the units will not interrupt traffic, hence there is no traffic time loss as a result of switching to standby. There is increased reliability since both operating units are continuously monitored for condition of operation. Space or frequency diversity equipments may be operated with a minimum of additional components. In addition to this high degree of reliability and continuous performance, Sinclair reports that "the signal-to-noise measurements have exceeded the original calculations and the system has provided excellent performance since the inaugural date of operation."

The Kellogg Model 10C-2 PTM Microwave System now features up to 45 channel multiplexing equipments. Channels are readily arranged to suit the needs of specific installation whether for telemetering, remote control, data and voice transmission. Our engineering staff is always at your service ready to discuss your communication problems.

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1 Easy maintenance, particularly of the RF equipment; visual test and check methods may be used.

2 Tubes may be changed at random *without* realigning the Intermediate Frequency Amplifier.

3 Where propagation is a problem due to multi-path cancellation, it is simple to install space diversity reception equipment.

4 Drop channels may be installed at random, without need to demodulate entire groups to audio.

5 Economical system design: drop and insert channels may extend only throughout those parts of the system where required, and not the entire length.

6 Maximum transmitter tube life; tube life averages approximately 15,000 hours for 2C39s.

7 All PTM channels are interchangeable, only one spare is required.

8 High signal-to-noise ratio: the inherent noise of each channel is "clipped" out. Each terminal and each repeater station transmits a fresh signal.

9 Less tower rigidity required for accurate signal transmission at 2000 mc.

10 Plug-in channel units feature printed circuitry replacing tubes with crystal diodes; demodulators semi-passive, one tube per channel; modulators passive, no tubes. Results in 4:1 reduction in the number of tubes and 5:1 reduction in power consumption.

Investigate these and other advantages of a Kellogg PTM Microwave system. Write for complete details.

PIPELINE CONSTRUCTION

U. S. regulatory agencies. To start late 1959.

- **Alberta Natural Gas Co., Ltd.** (Pacific Gas & Electric Co., San Francisco, and **Westcoast Transmission,** Calgary).

Project: 108 miles of 36-in. across southeastern British Columbia to U. S. border near Kingsgate, B. C.

Status: Pending approval of Canadian and U. S. regulatory agencies. To start late 1959.

- **Cartier Gas Corp.** (St. Maurice Gas, Inc., and Consumers' Gas Co., Toronto).

Project: 170 miles from Montreal to Quebec City.

Status: Proposed.

- **Northern Natural Gas Co.,** Omaha.

Project: 73 miles of 20-in. from Savanna Creek to Pincher Creek, Alta.

Status: Planned.

Project: 32 miles of 24-in. from Pincher Creek to Mont. border to tie in with planned U. S. line on to Minneapolis.

Status: Planned.

- **Saskatchewan Power Corp.,** Regina, Sask.

Project: 267 miles of transmission lines.

Status: Planned.

Completion: 1959.

- **Trans-Canada Pipe Lines, Ltd.,** Toronto.

Project: 500 miles of main-line loops.

Status: Planned.

Completion: Late 1962.

- **Van Tor Oil & Exploration Co.,** Vancouver, B. C.

Project: Line from B. C. mainland to Vancouver Island.

Status: Proposed.

Completion: 1960.

- **Westcoast Transmission Co., Ltd.,** Calgary.

Project: (See Alberta Natural Gas Co., Ltd., for joint project).

Foreign Crude Oil Pipelines

- **Arabian American Oil Co.,** Dhahran, Saudi Arabia and N.Y.C.

Project: 63 miles of 30, 32-in. from Khursaniyah to Ras Tanura.

Status: Planned.

Contractor: Company personnel.

Completion: January 1, 1960.

Project: 18 miles of 34, 36-in. from Qatif to Ras Tanura.

Status: Planned.

Contractor: Company personnel.

Completion: July 1, 1962.

Project: 6 miles of 30-in. from Ras Tanura to Ras Tanura terminal; 4 miles of 14-in. from Buqqa to QA-2 pipeline.

Status: Planned.

Contractor: Company personnel.

Completion: October 1, 1960.

- **Assam Oil Co.,** Digboi, Lakhimpur District, Assam, India.

Project: 600 miles of 20-in. from Nahorkatiya field in Upper Assam to Barauni, India, to connect with Burmah Oil Co.'s proposed 250-mile line from Barauni to Calcutta.

Status: Survey of possible routes under way.

Contractor: **Pipe Line Engineering Co.,** Dallas, is making survey.

- **Basrah Petroleum Co.**

Project: 70 miles of 30 and 32-in from Zubair to Fao, Iraq.

Status: Planned.

Completion: 1961.

Project: Two 32-in. submarine lines from Fao, Iraq, to island 24.3 miles out in Persian Gulf.

Status: Under way.

Contractor: **Collins Submarine Pipelines Overseas, Ltd.,** Port Lavaca, Tex.

Completion: Summer 1959.

- **Bolivia-Paraguay.**

Project: 500 miles of 6-in. from Southeast Bolivia to a proposed refinery on Paraguay River, and later to Asuncion.

Status: Planned.

- **British Petroleum, Ltd.**

Project: 60 miles of 18-in. across South Wales, from Milford Haven to the Llandarcy refinery.

Status: Under way.

Completion: Late 1959.

- **Burmah Oil Co., Ltd.,** Glasgow, Scotland.

Project: 250 miles of 20-in. from Barauni to Calcutta, India, extending Assam Oil Co.'s proposed line.

Status: Survey under way.

- **Colombian Petroleum Co.**

Project: 42 miles of 6-in from Tibu field to Rio de Oro in Colombia, S. A.

Status: Under way.

- **Colon Oil Co.**

Project: 26-mile, 8-in. line from Rosario to El Calvario, Venezuela.

Status: Under way.

Completion: May 1959.

Contractor: **Zaramella & Pavan.**

- **C.R.E.P.S., Societe Nationale de Recherche et d'Exploration des Petroles en Algerie (SN Repal)** and **Cie. Francaise des Petroles Algerie,** Paris, France.

Project: 470 miles of 24-in. from Edjele fields in southeastern Algeria to the Tunisian Mediterranean coast.

Status: Preliminary work under way. Pipe laying to start in 1959.

Contractor: **TRAPSA** (transportation subsidiary of CREPS), with technical assistance and supervision of the project by **Bechtel Mediterranean** (subsidiary of Bechtel Corp., San Francisco).

Completion: September 1960.

- **Elburz Oil Corp.**

Project: 1,000 miles of 38-in. to move Qum crude to the Mediterranean.

Status: Planned.

- **ENI (Italian state oil agency)** and **Italo-Swiss Finance Co.**

Project: 250-miles of 24-in. and smaller diameters from Genoa to Aigle, Switzerland.

Status: Planned.

Completion: 1961.

- **Iranian Oil Exploration & Producing Co.**

Project: 26 miles of 30-in. from Ganaweh, Iran, to Kharg Island.

Status: Under way.

Contractor: **International Marine Constructors, C. A.,** Port Lavaca, Tex.

Completion: Summer 1959.

- **Iranian Oil Participants, Ltd.**

Project: 30 miles of 20-in. and 22 miles of 16-in. looping of Agha Jari to Bandar Mashur line.

Status: Planned.

Project: 50 miles of 26, 28-in. from Gach Saran field to new terminal at Kharg Island in the Persian Gulf.

Status: Under way.

Contractor: A joint venture of **Raymond Concrete Pile Co.** and **Williams Bros. Co.,** Tulsa, **Richard Costain, Ltd.,** and **John Brown, Ltd.,** London, and **Werkspoor & Bredoro,** The Netherlands.

- **Iraq Petroleum Co.,** London.

Project: 600 miles of up to 40-in. from Kirkuk field through Iraq to Turkish port of Iskenderun on the Mediterranean.

Status: Proposed. Survey completed.

- **Israel Government**

Project: 16-in. loop of 8-in. line on 235-mile Gulf of Aqaba-Haifa system.

Status: Proposed.

Project: Replace 125 miles of 8-in. from Elath to Beersheba with 16-in.

Status: Planned.

- **Kuwait Oil Co., Ltd.,** London.

Project: 61 miles of 30-in. from Raud-

PIPELINE CONSTRUCTION

hatain area to Ahmadi.
Status: Under way.
Completion: June 1959.
Project: 5 miles No. 11 and 5 miles No. 12 gravity line from Ahmadi North Tank Farm to North Pier; 4 miles of 34-in. from Ahmadi South to Ahmadi North Tank Farm; 6 miles of 38-in. loading lines on North Pier.
Status: Under way.
Completion: First quarter 1959.

- **Mene Grande Oil Co.,** Caracas, Venezuela.

Project: 24 miles of 16-in. from Zarza to Zulus; 12 miles of 24-in. from West Guara to Oficina; 5 miles of 24-in. near Melones.
Status: Planned.
Completion: 1959.

- **Middle East Pipeline.**

Project: 1,500 miles of 38, 40-in. from Persian Gulf to Mediterranean at Iskenderun, Turkey.

- **Petroleo Brasileiro S. A. (Brazil).**

Project: 40 miles of 12-in. from Catu to Madre de Deus in Bahia.
Status: Under way.
Contractor: **Techint, Inc.**
Project: 80 miles of 24-in. to tie in to proposed Caxias refinery near Rio de Janeiro.
Status: Planned.

- **Rotterdam-Rhine Pipeline Co.** (Caltex Petroleum Maatschappij, Bataafsche Petroleum Maatschappij, Gelsenberg Benzin A. G., and Moiloil A. G.)

Project: 59 miles of 30-in. and 96 miles of 24-in. from Rotterdam to Ruhr industrial area in West Germany to supply refineries at Godorf and Wesseling, and a 25-mile branch to Wessel to serve the refinery in Gelsenkuchen.
Status: Under way.
Contractor: **Bechtel International Co.,** is project manager. **Associated Pipe Line Contractors** has most of construction. German and Dutch firms have 33 miles of 24-in. in south Holland and four major submarine crossings.
Completion: Mid-1960.

- **Royal Dutch-Shell.**

Project: 700-mile line across Europe from the Mediterranean to the North Sea, running through eastern France, Luxembourg, West Germany, Netherlands, and Belgium. Main line to be 30-in.
Status: Considering project as joint venture with several other companies.
Project: 161 miles 20-in. line from Tandzung field to Balikpapan refinery, Borneo.
Status: Planned.
Contractor: **Williams Brothers Overseas, Ltd.,** Tulsa, and **John Brown, Ltd.,** London.
Completion: January 1, 1962.

- **SOPEG** (construction organization for Cie. Francaise des Petrole (Algerie) and Ste. Nationale de Recherche et d'Exploitation des Petroles en Algerie).

Project: 412 miles of 24-in. from Hassi Messaoud field in the Algerian Desert to Bougie on the Mediterranean Coast.
Status: Under way.
Contractor: **Entrepose Co.** and **Ste. Parisienne pour Industrie Electrique** have 281 miles. **SOCOMAN** and **Eau Assainissement** have 131 miles.
Completion: Late 1959.

- **South European Pipeline Co.** (Jersey Standard, Caltex, and 17 European firms).

Project: 932 miles of 30-in. from Marseilles, France, to Hamburg, Germany.
Status: Proposed.

- **Superior Oil Co.,** Los Angeles.

Project: A 16 and 24-in. line from its Lake Maracaibo, Venezuela, production to shore.
Status: Planned.
Contractor: **Pipe Line Technologists, C.A.,** Maracaibo, has design.

- **Syrian Pipeline,** Damascus.

Project: 500-mile line from Karshuk field, Syria, to Mediterranean.
Status: Proposed.

- **Union of Soviet Socialist Republic.**

Project: 2,315 miles of 28-in. Trans-Siberian crude-products line from Ufa Tuimaza fields in Bashkiria to Irkutsk near Lake Baikal.
Status: Under way.
Project: 600-mile line from Russian fields to Czechoslovakia.
Status: Planned for 1960.
Project: Line from Russian fields to East Germany, possibly as part of a petrochemical expansion program.
Status: Planned.

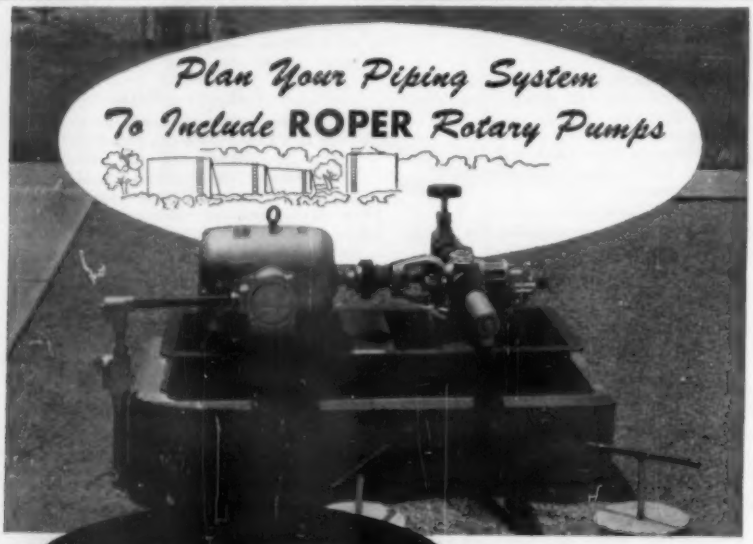
- **Venezuelan Sun Oil Co.**

Project: 18-in. crude line from Block 1, Lake Maracaibo, to Punta Palmas terminal.
Status: Under way.
Contractor: **J. Ray McDermott & Co.**
Completion: Summer 1959.

- **Yacimientos Petroliferos Fiscales (Argentina),** Buenos Aires.

Project: 815 miles of 12-in. from Campo Duran to San Lorenzo.
Status: Under way.
Contractor: **SARGO** (Fish Engineering Corp., Fish Northwest Constructors, Inc., Clark Brothers, North American Utility, Construction International Co.).
Contractor: **Techint, Inc.,** has subcontract for 600 miles of 12-in.
Status: Under way.
Completion: Mid-1960.
Project: 390 miles of 14-in. from fields in

(Continued on page 280)



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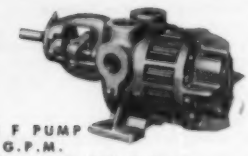

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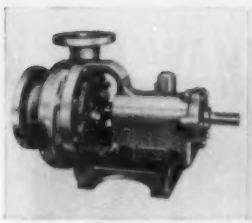
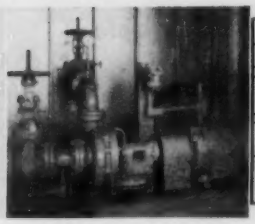
Throughout the oil world there are thousands of Roper Series F Pumps on the job. Big reason is *dependability.* Other reasons include: smooth, non-pulsating flow . . . equal size gears running in axial hydraulic balance . . . positive displacement requiring no priming . . . and importantly, four-port design. This latter feature of the Roper Series F Pump allows greater flexibility of installation . . . cuts installation time and costs. Four-port design, you see, permits 8 optional piping arrangements — 4 for CW and 4 for CCW operation. There are other Ropers in the line . . . in the pumping range and pressure range you require. Ask your distributor for all the facts . . . he'll show you how Roper can give you better service and higher efficiency in field storage, gathering line, and tank truck installations.

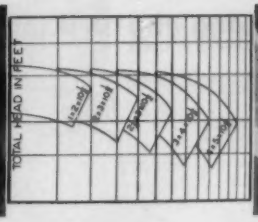
Roper Hydraulics, Inc.
493 BLACKHAWK PARK AVENUE
ROCKFORD, ILLINOIS

ROPER
ROTARY PUMPS

Sales and Service in All Oil Producing Areas







BECAUSE...
PEERLESS CHEMICAL PUMPS:

MEET critical standards of construction, you benefit from longer pump life, less maintenance, and sharply reduced incidence of system shut down caused by pump failure. Top quality Peerless construction means a dependable, rugged pumping unit you can count on to stay on the job for years longer.

PROVIDE proved operating history, you benefit from the knowledge that you're not buying a pump in the dark. Analysis by Peerless of customer pump operating records allows continuous product improvement. Correlation of this data provides Peerless with answers to nearly all field pumping problems.

OFFER optimum performance range, you benefit from the economical performance only the exact pump for the job can give you. The Peerless process pump line of over 78 models, sizes and frames, plus thousands of combinations, assures you of pinpoint pump selection that effects direct savings in cost.

EMBODY benefits of research in all areas of design, construction, and application. Typical of the many considerations in the design and manufacture of a Peerless pump is the ascertaining of effects of radial loads. **An interesting 8 page booklet discussing this phase of pump design is available to you upon request.**

Engineers and Pump buyers say:

"PEERLESS PUMPS IT BEST!"

...buy and apply PEERLESS PUMPS

Putting Ideas to Work

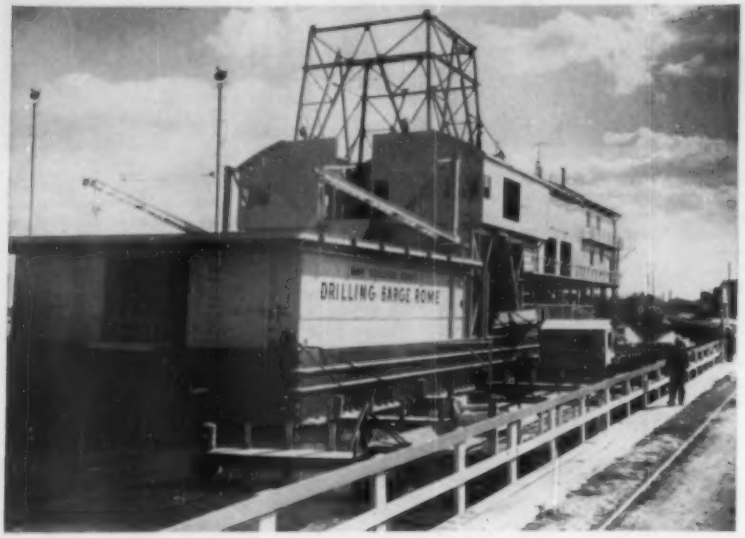
fmc FOOD MACHINERY AND CHEMICAL CORPORATION

Peerless Pump Division

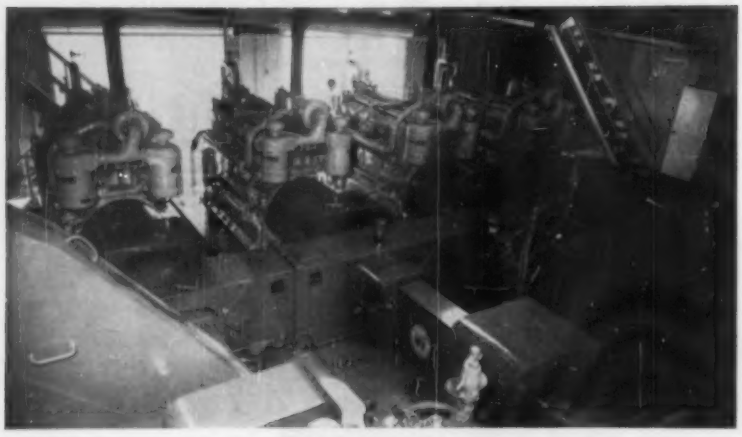
Plants: LOS ANGELES 31, CALIFORNIA and INDIANAPOLIS 8, INDIANA

Offices: New York; Atlanta; St. Louis; Phoenix; San Francisco; Chicago; Fresno; Los Angeles; Plainview and Lubbock, Texas; Albuquerque.

Distributors in Principal Cities. Consult your telephone directory.



This submersible offshore barge . . .



with four turbocharged diesel engines means a . . .

Powerful new drilling barge for Louisiana's inland waters

A SUBMERSIBLE drilling barge recently commissioned by Bay Drilling Corp., will be one of the largest and most powerful to operate in South Louisiana's inland waters.

First drilling assignment is for Superior Oil Co. in the Houma area in Terrebonne Parish, on South Louisiana's coast. The new barge, named "Rome" for D. J. Rome, Bay's assistant drilling superintendent, is the company's second. The other, also under contract to Superior, is in the deep Bayou Penchant field, in the coastal marshes, 25 miles southwest of Houma.

The barge was built and equipped at Levingston Shipbuilding Co.'s yards at Orange, Tex. It has a slotted hull 190 ft. long, 50 ft. wide, and 14 ft. high, and is designed to drill in protected and semiprotected water beds 9 to 12 ft. deep. Derrick substructure and superstructure stand above main deck to support the derrick, drilling machinery, pipe racks, and crew quarters.

Four turbocharged Caterpillar D-397 Series D diesel engines, driving through torque converters and compound, provide the power for the drilling assembly's National 130 draw works and two National G 1000-B mud pumps. An additional National 150-B mud pump is separately powered by another turbocharged Caterpillar diesel engine. The rotary also is independently driven by another turbocharged diesel engine, a D 375. Two additional D342 Series C turbocharged diesels drive the barge's two generators, each producing 150 kw. at 240 volts to supply the barge's electric power.

Bay's drilling operations are directly supervised by O. O. St. John, drilling superintendent, with Rome as assistant. President of the company is Donald Peltier.

THESE MEN headed up operations for the new offshore drilling rig. They are, left to right, O. O. St. John, drilling superintendent; Donald Peltier, president; and D. J. Rome, assistant drilling superintendent, for whom the barge was named.

Rigs in demand for Alaska drilling

Two drilling contractors with rigs in Alaska currently are in the enviable position of having operators standing in line to sign up their equipment.

General Petroleum Corp. is negotiating with Humble Oil & Refining Co. to get the Rowan Drilling Co. rig which recently drilled Alaska's record-setting 14,374-ft. wildcat for Humble on the Bear Creek unit. General Petroleum has a commitment to start a wildcat in the Bristol Bay area across the Alaska Peninsula from Bear Creek by June 1.

Across Cook Inlet from Bear Creek, Union Oil Co. of California is dickering with Halbouty Alaska Oil Co. for next use of the Coastal Drilling Co. rig currently drilling for Halasko-King Oil Co. on the Kenai Peninsula. Union wants the rig for a wildcat planned at a site about 5¾ miles north of Kasilof and 5½ miles south of the Kenai River on the beach.

IF YOU WANT MORE* THAN A GOOD CEMENT JOB...

* *Casing on Bottom Safer and Faster*
* *Protection of Productivity*

...Specify BAKER PRIMARY CEMENTING EQUIPMENT

The ONLY complete line— available through your supply store.

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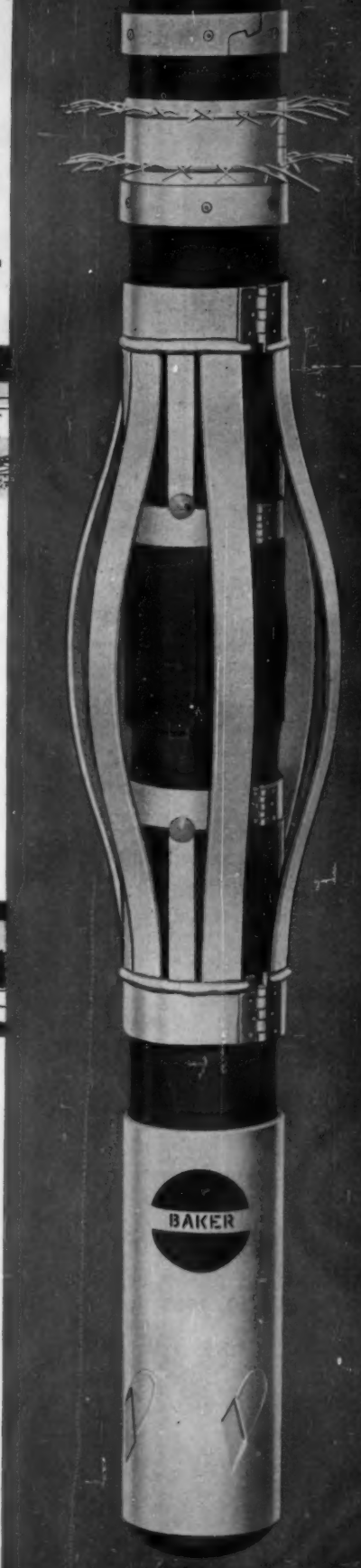


BAKER Wall Scratchers

... remove mud cake *only* from the cementing area. This "controlled scratching" protects productivity. No danger of "balled-up" mud on scratcher wires to plug the annulus with possible pressure surges, and "mudding-off" of production.

BAKER Casing Centralizers

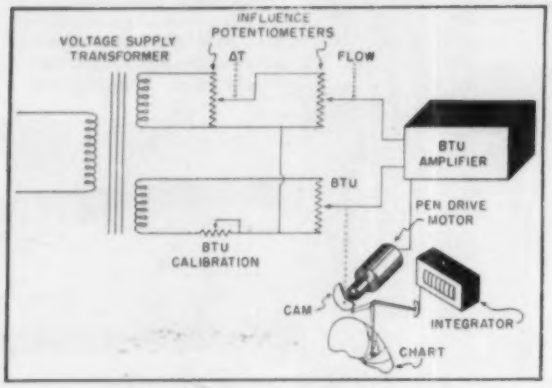
... assure cementing clearance and do not remove mud cake to plug the annulus, contribute to pressure surges and restrict productivity. The "sled-runner" springs are pre-set to the optimum bowed height, and pass tight spots or dog legs without damage to the centralizer assembly. Their greater centering force maintains ample annular clearance for successful primary cementing.

BAKER Fill-Up Equipment

... saves time in running casing. but does not create pressure surges that restrict productivity. The Variable Valve in Baker DIFFERENTIAL or FLEXIFLOW "Fill-up" Shoes and Collars permits casing to fill from the bottom, and coordinates *rate of fill* with *rate of lowering* to AVOID high-pressure surges. Surface filling is eliminated, danger of stuck pipe is reduced, chances for successful cementing are increased.

▶ ▶ ▶ New Equipment Section

This week's SHOWCASE features . . .



Virtually unaffected by temperature changes . . .

B.t.u. meter determines heat loss

. . . or gain by a flowing liquid. In the Model 913 meter now available, one instrument is used to continuously record, indicate, and integrate the heat loss or gain. On the same chart, temperature differential and flow rate of the liquid are recorded. Potential uses for the meter include measurement of heat transfer in cooling towers, refrigerating systems, and other such heat exchangers in processing.

The two platinum elements are differentially connected to measure inlet and outlet temperature of the liquid. They form two legs of a resistance bridge in which the differential-temperature receiver in the recorder acts as a rebalancing unit. Liquid flow is measured by a flow transmitter and recorded.

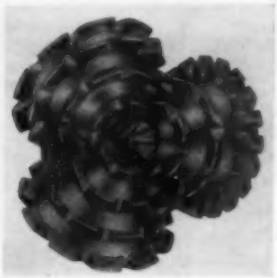
Differential-temperature and flow-retransmitting slide-wires on their respective receiver units are connected to multiply their respective signals. The product represents the number of B.t.u.'s gained or lost per unit of time by the liquid. **Write or call: Hays Corp., Michigan City, Ind., for details on Model 913 B.t.u. meter.**

●

Pump case with molybdenum iron housing

. . . has a tensile strength of about 50,000 psi. The use of 35% Molybdenum iron alloy promises to result in a tighter grain structure in the thicker casting sections, thereby reducing the graphitization rate. Granular changes in the metal structure result in a more uniform casting and machining, the maker reports. **Write or call: Layne & Bowler Pump Co., 2943 Vail Avenue, Los Angeles 22, for details on Verti-Line pump case.**

●



Rock-bit teeth cover entire

. . . bottom of hole during drilling. Cones are offset 2° from the apex to create a chipping action on the hole bottom. The Type WBS bit was designed to drill hard formations such as chert, quartzite, granite, and pyrite.

Weights of 4,000 to 6,000 psi. of bit diameter can be applied with safety at rotary speeds of 35 r.p.m. or less, according to the maker. He also reports that the bearings are capable of withstanding any kind of shock without breakage in percussion downhole hammer drilling.

The bit is available in sizes of 5⅝, 6, 6¼, 6¾, and 7⅞ in. **Write or call: Oil Tool Mfg. Co., Inc., P. O. Box 712, Tonkawa, Okla., for details on Type WBS rock bit.**

●

Submersible motor for 4-in. wells

. . . promises to carry higher loads per rated horsepower than older types of construction. The motor employs an oil-filled design that gives fast heat dissipation.

Filled with refined mineral oil, the motor circulates the oil continuously around the windings and transfers internal heat to the cooler motor shell. The ½-hp. unit shown has a 1.6 service factor, attributed to the efficient heat-transfer system.

A lead seal is used to overcome

Send this Showcase Coupon

to the Manufacturer of the item in which you are interested. See name, address, and equipment name and/or model, in bold-face type at end of description.

NAME AND/OR MODEL NUMBER.....

.....

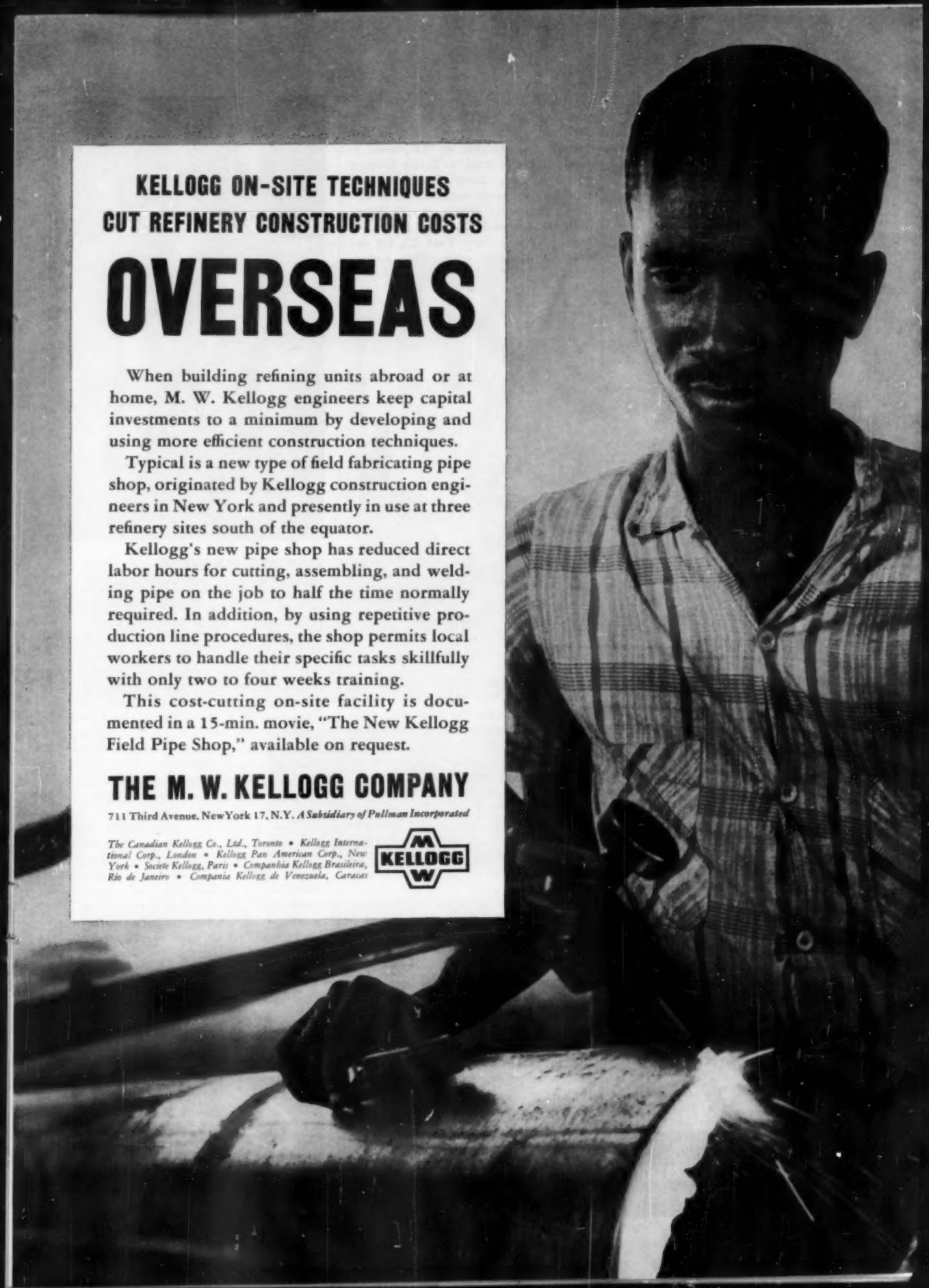
Described in OIL AND GAS JOURNAL - Issue of March 30, 1959

NAME.....TITLE.....

COMPANY.....

ADDRESS.....

CITY.....STATE.....



KELLOGG ON-SITE TECHNIQUES CUT REFINERY CONSTRUCTION COSTS

OVERSEAS

When building refining units abroad or at home, M. W. Kellogg engineers keep capital investments to a minimum by developing and using more efficient construction techniques.

Typical is a new type of field fabricating pipe shop, originated by Kellogg construction engineers in New York and presently in use at three refinery sites south of the equator.

Kellogg's new pipe shop has reduced direct labor hours for cutting, assembling, and welding pipe on the job to half the time normally required. In addition, by using repetitive production line procedures, the shop permits local workers to handle their specific tasks skillfully with only two to four weeks training.

This cost-cutting on-site facility is documented in a 15-min. movie, "The New Kellogg Field Pipe Shop," available on request.

THE M. W. KELLOGG COMPANY

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COSTLY LEAKS OF VALUABLE FLUIDS

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DURA SEAL

THE ENGINEERED MECHANICAL SEAL

Savings in product alone will repay the cost of Dura Seal installation

For further information, write for free Bulletin No. 480OG

The PERFECT SEAL

DURAMETALLIC CORPORATION
KALAMAZOO, MICHIGAN

capillary action of the oil. To prevent oil loss and lead deterioration, the lead connection is solid in the middle and molded in neoprene. A sand slinger is used to throw foreign particles away from the shaft and seal and so keep abrasives from entering the motor. **Write or call: International General Electric, 570 Lexington Avenue, New York 22, for details on oil-filled submersible motor.**

•

Bar-leak survey machine

. . . is self-propelled and designed to probe and test gas mains and services for leakage along the curb and over the mains and services right up to the building wall. The maker says one man can power check 28 blocks of mains and services in only 8 hours.

The machine is equipped with push-button controls that let the operator complete a leak test in 15 seconds. The machine has a short turning radius and reverse gear that let the operator get close to curbs and buildings.

A hydraulic cylinder arrangement on the Gas Hound machine inserts the probe into the ground. While the probe is in the ground, the air sample is taken through the probe. A continuous suction is maintained on the probe sampler. Thus the presence of gas is detected when the probe reaches a gas-containing area.

When the probe is removed from the ground, the continuous suction clears it for the next test. The continuous suction is achieved by connecting the aspirator end of a combustible gas indicator to a vacuum chamber attached to the intake manifold of the machine's engine. **Write or call: Detecto Co., 105 Sixth Avenue, N. W., Clarion, Iowa, for details on Gas Hound.**

CASING HANGER HOLDS MILES OF PIPE

Almost three miles of heavy 9⅝" oil field casing have been hung on a Cameron "CA" Automatic Casing Hanger. Suspending and sealing off the tremendous casing loads used in today's deep, high pressure drilling is no longer a problem. With the Cameron "CA" you can hang (and seal) casing for any well, shallow or deep, low pressure or high—automatically and positively. This foolproof solution simplifies the whole critical operation when casing is ready to be set. Because of its unique design the segmented slip assembly will not set prematurely. Slip contact automatically adjusts itself to the load suspended while affording a perfect pack-off against pressure. "CA" Casing Hangers will suspend all casing lengths without bottlenecking at pipe loads equivalent to API joint strength—will seal highest pressures even though casing load may be extremely low.

You can COUNT ON CAMERON "CA" CASING HANGERS for any depth or pressure anticipated today. It's no wonder we sell so many.

Cameron
IRON WORKS, Inc.
P. O. Box 1212 — Houston, Texas
Export Office: 7912 Empire State Bldg., New York City. In England: Cameron Iron Works Ltd., 76 Grosvenor St., London W. 1 England.

POTENTIAL

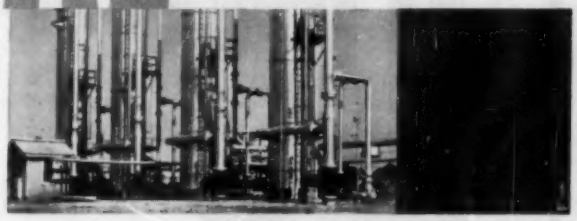
1. FABRICATION of all types of equipment (Fractionating Columns, Gas Columns, Pressure Vessels, Plate and Heavy Steel Work, Special Machines, Autoclaves, Shells, Bridge Girders) is performed to order, to specification.

2. MACHINING—Fully equipped, flexible facilities for machining to close tolerances, regardless of product size or design.

3. STAINLESS—Separate, integrated shop for stainless fabrication protects against contamination by ordinary steel.

4. DELIVERY by rail, truck or inland, coastal or overseas waterway.

1 FABRICATION



2 MACHINING

3 STAINLESS

4 DELIVERY

Through integrated, efficient operation, Sun Ship can reduce costs, increase your POTENTIAL. Call for an estimator or representative.

Sun

SHIPBUILDING & DRY DOCK COMPANY

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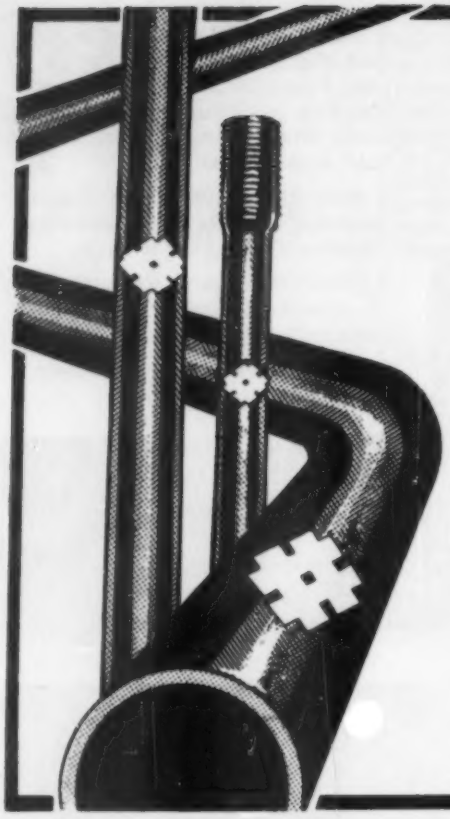

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OIL and GAS DEPARTMENT

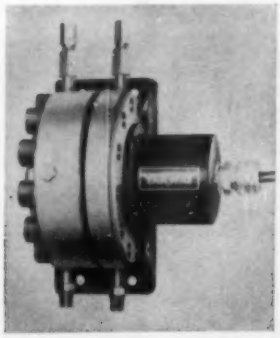
MERCANTILE NATIONAL BANK
DALLAS, TEXAS

Trencher has many new features

. . . which include an all-riveted 20,000-lb.-test digging chain and digging teeth which are heat-treated with hard-surfaced cutting edges. The Model M-3 Ditch Witch contains a telescoping digging boom, spring-tension adjustment for the chain, and a new boom-positioning screw which increases raising and lowering speed.

The trencher also features a new planetary gear-reduction unit and a single-lever shift device which easily changes reduction range from travel speed to digging speed. Powered by a 9.2 hp. engine it digs to 4 ft. at widths to 8 in. **Write or call: Charles Machine Works, Inc., 684 B Street, Perry, Okla., for details on Model M-3 Ditch Witch trencher.**

●

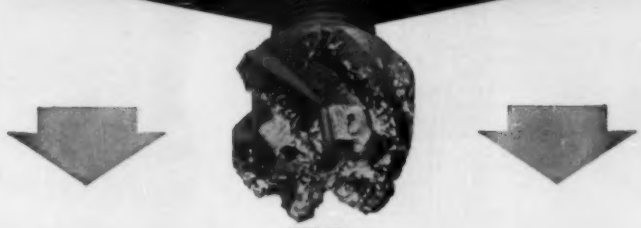


Differential-pressure transmitter

. . . operates without visual indication and controls a distant indicator, controller, or other electrically operated receiving instrument.

The instrument consists of: (1) a diaphragm mechanism in a pressure housing with pressure connections at

WHIP DOWNHOLE MILLING COSTS WITH KINZBACH SPEEDMILLS



TYPE 155

Continuously renewed multiple cutting edges, in optimum arrangement with tool shape, work contact areas, flushing passages, and other factors combine to make Kinzbach Speedmills highly efficient for downhole metal cutting operations.

Kinzbach Speedmills cut rapidly, leave clean work surfaces, and may be run under severe weight and speed conditions.

Types available for every downhole milling problem.

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DESIGNED, TESTED AND PROVEN IN THE OIL FIELDS

Screened Air Port

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- DRIP PROOF
- VERMIN PROOF
- MOISTURE PROOF
- CORROSION RESISTANT
- FORCED AIR COOLED

All these features of Fieldmaster Ball Bearing Motors have been designed to overcome the rugged conditions of Oil Field requirements.

CHECK THESE OUTSTANDING ADVANTAGES.

Heavy Cast base for alignment, stability, heavy duty, double-shielded, prelubricated bearings, reduces lubrication worries, high grade silicon steel in the magnetic circuit reduces iron losses . . . Wide variety of windings provides triple ratings, dual voltages . . . high torque licks heavy starting problems. High slip is available to take care of reciprocating load requirements encountered in pumping.

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Write For Descriptive Literature.

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FOR OIL COUNTRY USE

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Black or Galvanized
PLAIN TUBING COUPLINGS A.P.I.
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EXTERNAL UPSET TUBING COUPLINGS A.P.I.
¾" to 3½"—Seamless
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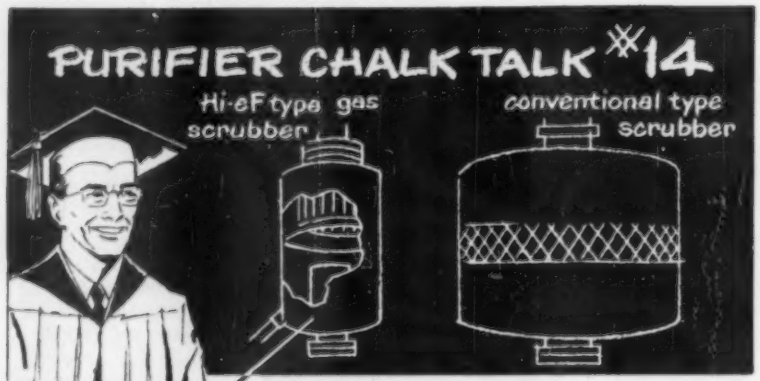
WHEELING MACHINE PRODUCTS COMPANY
WHEELING, WEST VIRGINIA
WEST COAST FACTORY: WOODLAKE, CALIFORNIA

PURIFIER CHALK TALK #14



Which gas scrubber costs less?

Isn't it obvious that the smaller unit on the right costs far less to fabricate or to buy? Yes, you get more for your gas scrubbing dollar with Hi-eF Purifiers, scrubbers, separators and mist extractors. Analyzed in terms of efficiency they outstrip any unit, yet are ⅓ the size of most. For complete details, write for Bulletin 803.

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ANDERSON Hi-eF PURIFIERS

PURIFIERS . . . SEPARATORS . . . SCRUBBERS

the bottom; and (2) a sensing coil which operates the remote receiver. The sensing coil is protected by a weatherproof cover. Cable connection to receiver is at the right end of the cover.

The transmitter, which can be mounted at any convenient location, is connected to a liquid vessel, fluid line, or other container by two tubes. At the transmitter, the tube connections lead to opposite sides of the diaphragm. Variation in the differential pressure on diaphragm causes change in output of sensing coil which is transmitted to the remote receiver. **Write or call: Yarnall-Waring Co., Chestnut Hill, Philadelphia 18, for Bulletin WG-1824, Supplement A.**

●

Engine air conditioner

. . . washes incoming air and removes dust through a curtain of water spray. Temperature is then reduced to near the wet-bulb temperature of incoming air, by means of an evaporative-cooling principal.

In addition, a modified form of water injection is effected as the throwout design prevents carryover of water droplets to the engine. The Beeco air conditioner is mounted directly on the engine and will fit in place of a conventional oil-bath carburetor air cleaner. **Write or call: Beeco Engine Air Conditioner Div., Basin Engine & Equipment Co., P.O. Box 1636, Farmington, N. M., for details on Beeco air conditioner.**

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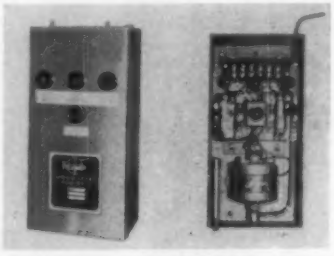

Liquid-level control

. . . for pressure ranges from 0.02 to 100 psi. and to 30-in. vacuum is actuated by a pressure element connected through tubing transmission lines to an "air-bell" pickup device located in the tank at the approximate level where alarm or activation is desired. Finer adjustment is made within the control by resetting the pressure element.

The pressure signal actuates a com-

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DIRECTIONAL DRILLING TOOLS AND SURVEYING EQUIPMENT

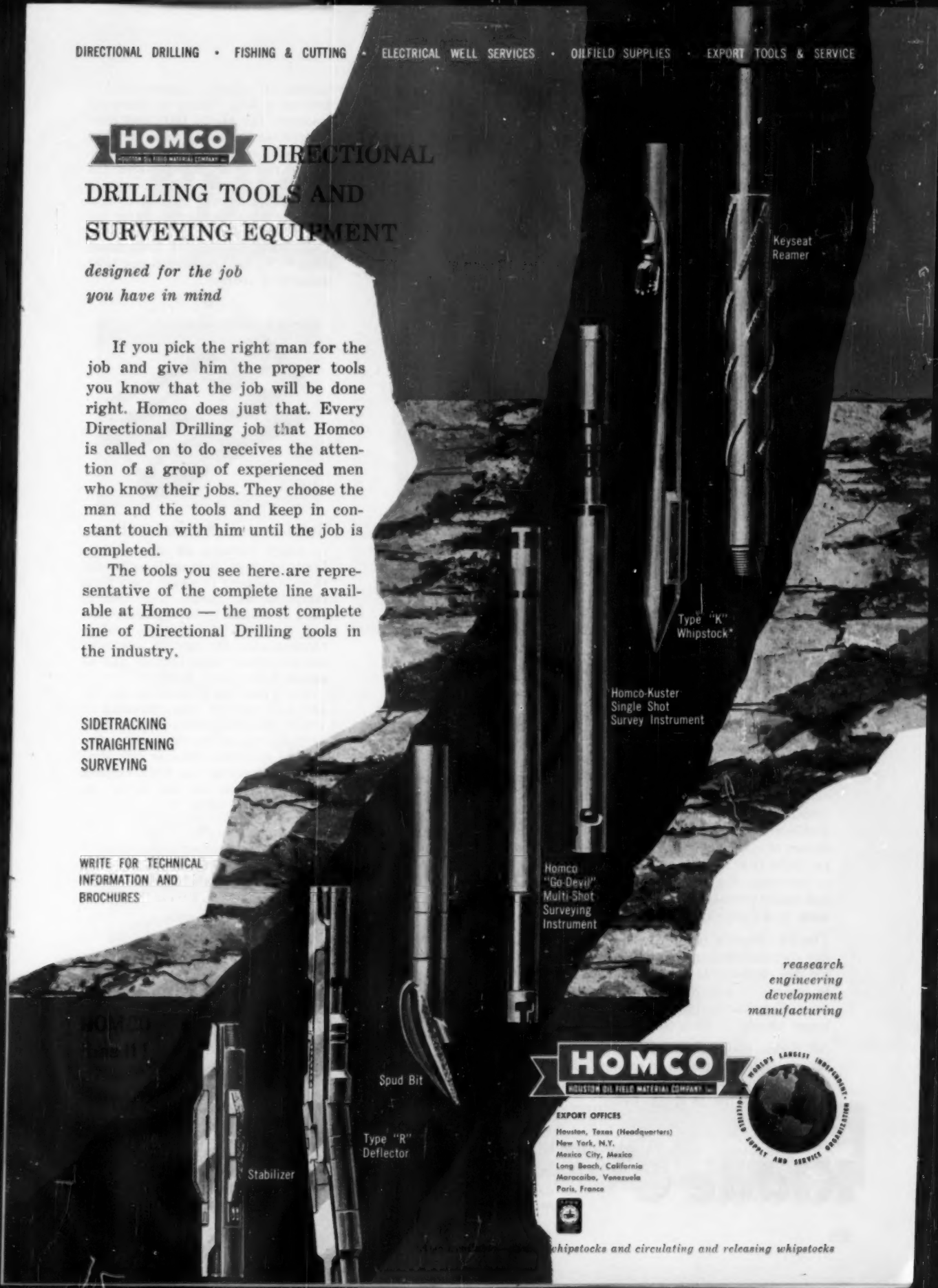
designed for the job you have in mind

If you pick the right man for the job and give him the proper tools you know that the job will be done right. Homco does just that. Every Directional Drilling job that Homco is called on to do receives the attention of a group of experienced men who know their jobs. They choose the man and the tools and keep in constant touch with him until the job is completed.

The tools you see here are representative of the complete line available at Homco — the most complete line of Directional Drilling tools in the industry.

SIDETRACKING
STRAIGHTENING
SURVEYING

WRITE FOR TECHNICAL INFORMATION AND BROCHURES



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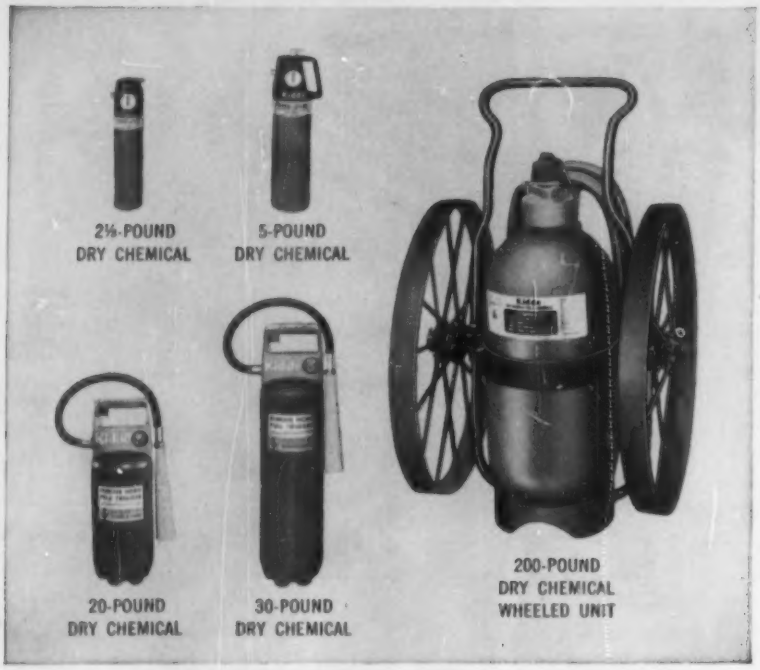
whipstocks and circulating and releasing whipstocks

Now! FULL-POWER Fire Fighting with this complete dry chemical line!



Kidde top-rated portables and wheeled units kill more fire... faster!

From the powerful new 2½-pound portable, on up to the giant 200-pound wheeled unit, Kidde dry chemical extinguishers pack the *extra* punch needed for stubborn blazes, for *full-power* fire fighting. Available in pressurized 2½, 5, 10, 20 and 30-pound capacities, Kidde dry chemical portables feature simple, one-two operation, are easiest of all portables to operate, even while wearing gloves. Kidde portables have no valves to turn, no pins to pull, need no bumping or inverting. Just aim, pull trigger, and fire's out! All are quickly and easily pressurized, have dust- and moisture-proof gauges which show at a glance when unit is charged.

The 200-pound Kidde pressurized wheeled unit discharges a 40-foot dry chemical stream faster, has an *extra* 50 pounds of fire-smothering dry chemical to knock down fire quicker. It's faster and easier to operate... just remove pin, swing toggle lever, and flip on-off lever. Easy to maneuver because of its low center of gravity and larger wheels. Truly a one-man fire engine!

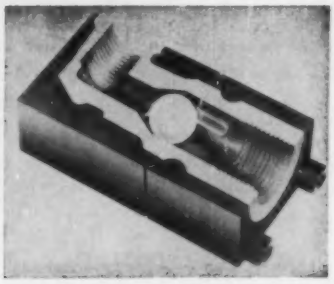
All Kidde extinguishers are granted top rating by Underwriters' Laboratories, are the finest extinguishers on the market today. Get more information about this *complete* line of *full-power* fire fighting equipment. Write to Kidde today!

Kidde

Walter Kidde & Company, Inc.
354 Main St., Belleville 9, N. J.
Walter Kidde & Company of Canada Ltd.
Montreal—Toronto—Vancouver

bination of electrical components to perform a wide variety of electrical functions. The Model 1800 level control will start or stop a pump or open or close a solenoid valve. In addition, it can sound alarms within the control and at remote points, provide means for silencing the alarm, and return to a standby condition for the next cycle. **Write or call: Petrometer Corp., 43-22 Tenth Street, Long Island City, N. Y., for details on Series 1800 liquid-level control.**

●

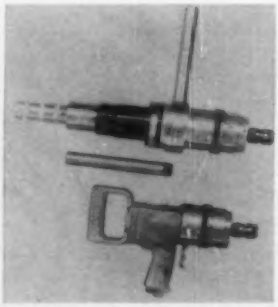


Steel-armored check valve

... which features all-fluorocarbon construction on fluid surfaces is said to be impervious to almost every fluid except molten sodium. The Kemlon valve is offered in burst-pressure ratings in excess of 1,000 psi. and is recommended for severely corrosive service where valve failures due to valves sticking is a problem.

The valves are available in ½, ¾, and 1-in. sizes, in either threaded or 150-lb. ASA flanged-body styles. Either right-angle or in-line construction may be specified. **Write or call: Keystone Engineering Co., 6315 England Street, Houston 21, for details on Kemlon check valve.**

●



Tube-expander drives

... which are air-powered and magnetically controlled offer fast precision tube rolling. Available in two models, the units control rolling action by means of a powerful, permanent magnet set that disengages and stops the rolling instantly when preset torque level is reached.

NOW

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with all these benefits of GRADIATION® HEATING:

- *PRECISENESS*
- *UNIFORMITY*
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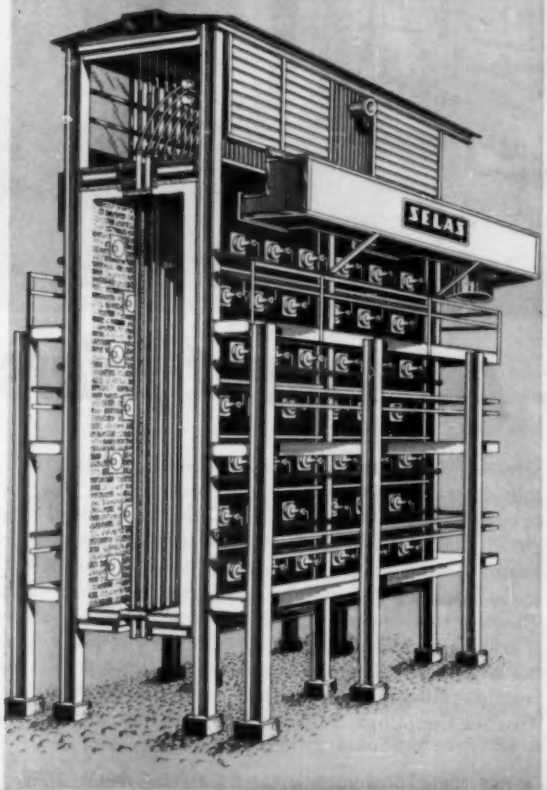
- *VERSATILITY*



STEAM-METHANE REFORMING is accomplished in this Selas Vertical Tube Heater under accurately controllable conditions.

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Heat and Fluid Processing Engineers

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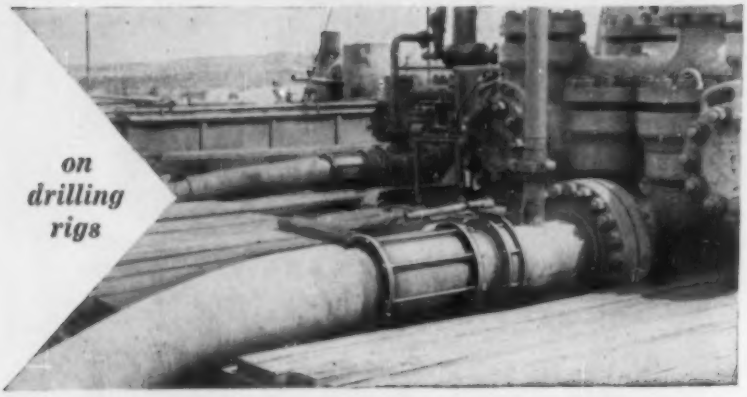
Dresser® Couplings—



fast, vibration proof...

safe, permanent joints!

Dresser Couplings are easily installed . . . only two man-minutes per bolt with a simple hand wrench. The specially compounded Dresser Gasket provides the essential "give and take" to absorb vibration, settlement, and other stresses that might cause damage. It also allows up to 4° pipe deflection at every joint and still maintains a permanent, bottle-tight seal. Eases of take-down and re-usability of Dresser Couplings are a tremendous asset where you may need to add new pumps, valves or lines. Send for Dresser Catalog No. 531. It contains more detailed information and complete specifications on *all* Dresser Couplings, Fittings and Pipe Repair Products.

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DRESSER
MANUFACTURING DIVISION

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The motors are trigger-controlled and explosionproof. Operation is simple—the motor runs forward when the trigger is squeezed and reverses when the trigger is released. No tools are needed for torque setting.

The standard model (lower photo) has a motor speed of 1,000 r.p.m., features maximum torque with pistol-type squeeze trigger, weighs 10 lb., and is 10¼ in. long. The heavy-duty model (upper photo) has a choice of rolling speeds, is controlled by a valve handle, is 19¼ in. long and weighs 12½ lb. Expanders are available for tubes ¼ through 3 in. **Write or call: Elliott Co., Lagonda Plant, Springfield, Ohio, for Bulletin Y-53.**

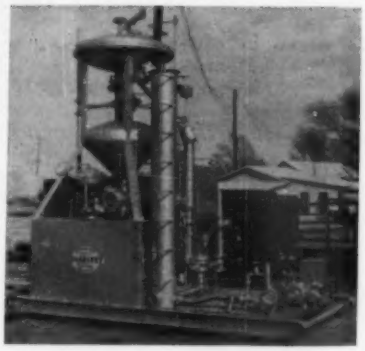
•

Liquid level control does two jobs

. . . as it serves as both a high and a low-level control. The Model KT tandem control is designed with two electrical signals in one explosionproof housing.

Operated by a float, the control is available for internal installation as illustrated or for external installation with a float chamber. **Write or call: Jo-Bell Products, Inc., 5456 West 111th Street, Oak Lawn, Ill., for details on Model KT tandem control.**

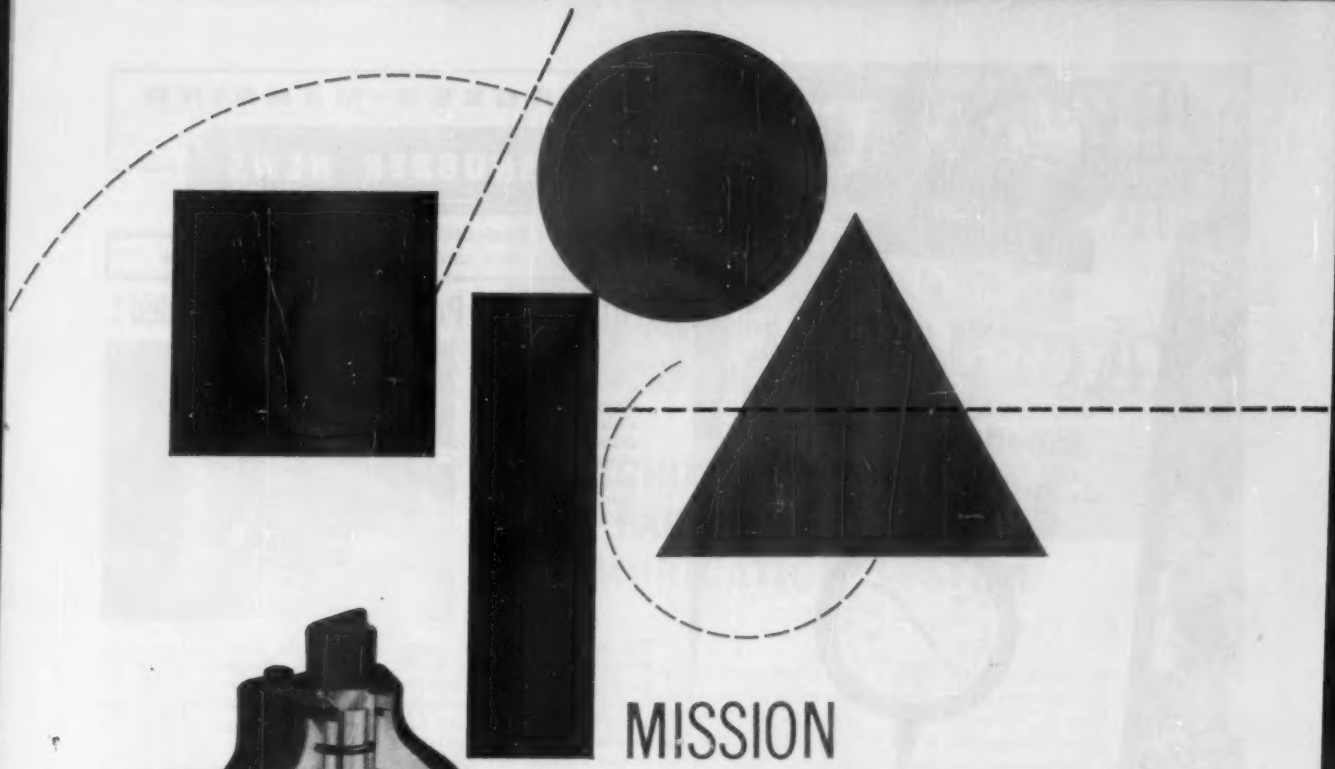
•



LACT unit for small leases

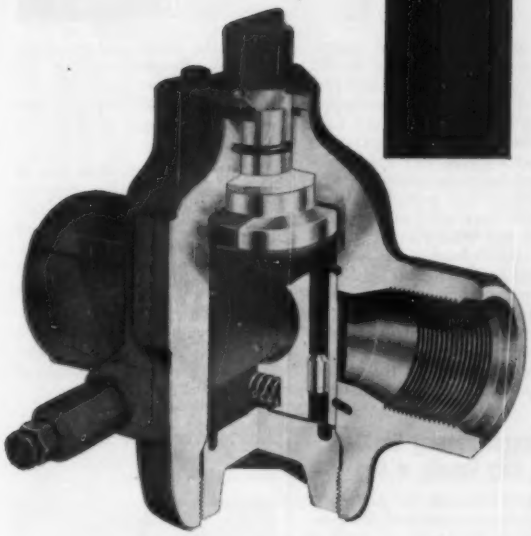
. . . handles 1 to 400 bbl. a day. This new unit employs a calibrated dump tank as the volume-measuring device. All components including the pipeline surge tank, are mounted on the skid. It uses a pneumatic control system.

The meter tank is an insulated plastic-coated type with a 1-bbl. chamber. It measures a fixed volume between the valves V-3 and V-2. No weirs are used for measurement.



MISSION

the valve that thinks for itself!



Cut-away Mission Valve

Here's a valve that knows exactly what to do:
The higher the pressure, the more tightly the valve seals.
And it's as simple as this—line pressure forces
Mission Sealant through two semi-circular grooves around
the downstream port, sealing like a plastic packing,
to form a gas-tight seal. Leaks are stopped
automatically *before* they can start.

Two split cylindrical cores, acting like a gate,
are wedge-proof, allow easy opening and closing even
under pressure. Only the downstream core is pressed against
the body by line pressure. The upstream half is held
lightly in place by springs. Core friction is thus cut in half.

The complete line of 315 Mission Valves brings
these positive advantages of easy opening and
tight sealing to practically all valve applications.
This wide selection, the Mission Guarantee, and the
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Specify Mission and eliminate your valve problems.

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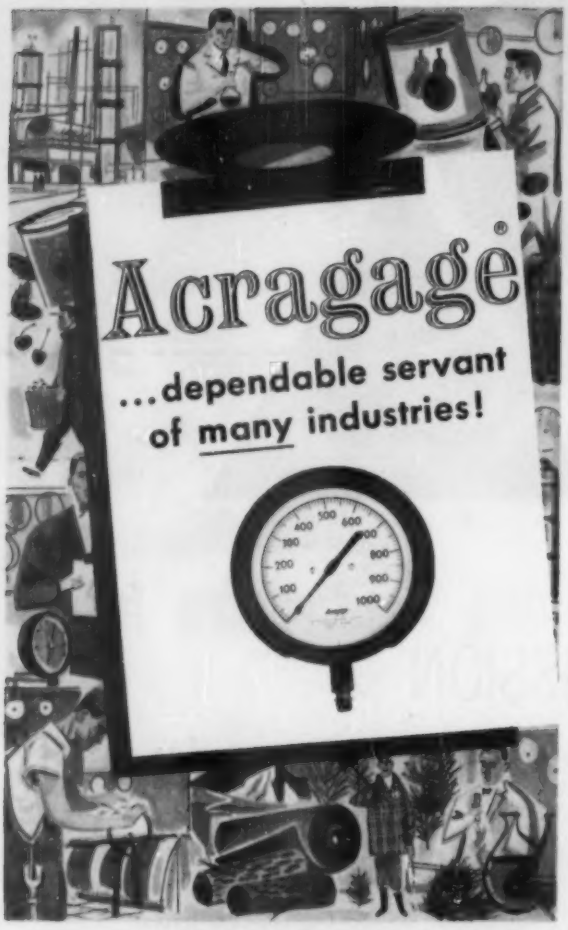

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BURGESS-MANNING

SNUBBER NEWS

Dedicated to the Elimination of Pulsation and Intake and Exhaust Noise

Fifteen Year Pulsation Problem Ended!

Burgess-Manning Pulsation Snubbers, installed in the discharge laterals, effectively eliminate a costly 15 year old pulsation problem.

The four horizontal gas engine driven air compressors at the plant of a glass company presented a puzzling and costly pulsation problem from the time they were first put in operation. Numerous pipe line breaks occurred due to mechanical fatigue caused by gas pulsation. Bracing, the installation of expansion joints and other remedial measures tried from time to time proved ineffective.

Finally, after years of unsuccessful efforts to correct this violent pulsation condition at a substantial cost, Burgess-Manning engineers were called into consultation. The condition required the design and construction by Burgess-Manning of special snubbers that were installed in the 45 psig pressure discharge laterals adjacent to each compressor.

As a result, for the first time in 15 years, pulsation in the air lines was reduced to a satisfactory level, and the costly and damaging vibration in the discharge headers and after-coolers was completely eliminated.

The Burgess-Manning Company, through its long experience in this field, is equipped to analyze such problems and engineer an effective solution.

Burgess-Manning Snubbers Vary Greatly in Size

Depending upon the particular job to be accomplished, Burgess-Manning Snubbers are built in an extremely wide range of sizes. Some exhaust snubbers are as small as 4½" in diameter for installation on a 1" exhaust line. The other extreme is the specially designed snubber recently engineered to silence the exhaust of a 5000 KW Gas Turbine Generating Unit, which measures 74 ft. in length and 12 ft. in diameter and is believed to be the world's largest.

This is a cross-section of a snubber typical of many styles designed and built by Burgess-Manning to eliminate pulsation in gas and air pipe line systems or exhaust noise from internal combustion engines, blowers, turbines, compressors, etc.

SEND US a brief outline of your pulsation or exhaust noise problems and we will gladly send you pertinent literature.

BURGESS-MANNING COMPANY
Sound Engineering *Industrial Silencer Division*
9217 Sovereign Row, Dallas, Texas
Libertyville, Illinois

Either lease gas or a small compressor can be used to furnish power for operating the pneumatic control system (an electrical control system is optional). Electrical power is required only to operate the pipeline pump, bad-oil recirculation pump, and b.s. and w. monitor. Flow from the treater is by gravity. Thus no charge pump is needed.

Both the size and rate of sampling are variable. Draindown is visible through a glass cover. No relays are used in the control system. The pipeline pump is started and stopped on a 10-bbl. run. A small surge tank atop the unit stores incoming oil while the meter is dumping. **Write or call: McKelvey Steel Corp., 3704 Dawson Road, Tulsa, for details on 400-bbl. LACT unit.**

●

New hose renders service

. . . at pressures from 10,000 psi. for four-ply and 12,500 psi. for six-ply in the ¾-in. i.d. size to 2,500 psi. for four-ply and 3,000 psi. for six-ply in the 1½-in. i.d. size. The four and six-ply styles are of the all-spiral wound-wire type.

Wire reinforcements of the Super-Spiral hose have a complete absence of wire braid found in conventional high-pressure hoses. The spiral construction permits use of heavier wire, eliminates crossed wires of braid, and reduces wire fatigue.

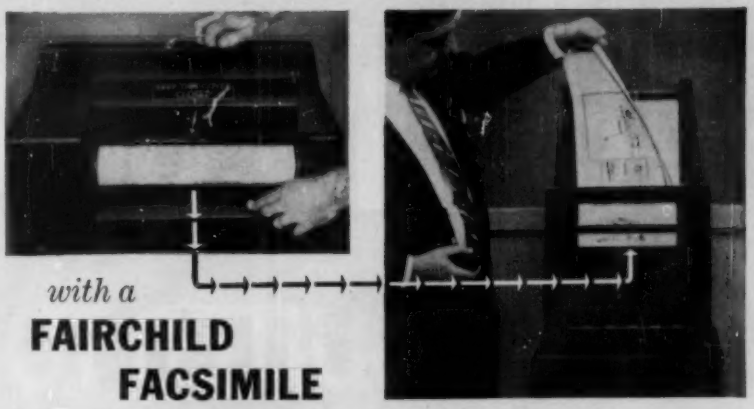
The inner tube is constructed of oil-resistant neoprene compound, reinforced by an open textile braid. **Write or call: Anchor Coupling Co., Inc., 342 North Fourth Street, Libertyville, Ill., for details on Super-Spiral high-pressure hose.**

●

Plastic insulating head for anodes

. . . for heater or oil-emulsion treaters is molded on to the anode to give a leakproof connection, along with permanent insulation and support. It's designed for easy installation into a victaulic-type nipple. A glass and fiber material is used in the insulating head to give moisture-vapor resistance, dielectric properties, and compressive strength. **Write or call: Tejas Plastics Materials Supply Co., P.O. Box 11302, Fort Worth, for Plastic Insulation Head catalog sheet.**

transmit **ANY** *data* **ANY** *distance*



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Oil and gas industry applications

Petroleum companies can increase the value of the microwave equipment they already have. Champlin Oil and Refining Co. of Fort Worth, for example, uses Fairchild Facsimile to save time in transmitting production reports, shipping schedules and accounting data daily from its Oklahoma refinery. Other uses for the petroleum industry include transmission of run-tickets, geophysical charts and seismograph recording tapes, well-survey and well-log reports, aerial patrol photos, compressor-engine performance cards, etc.

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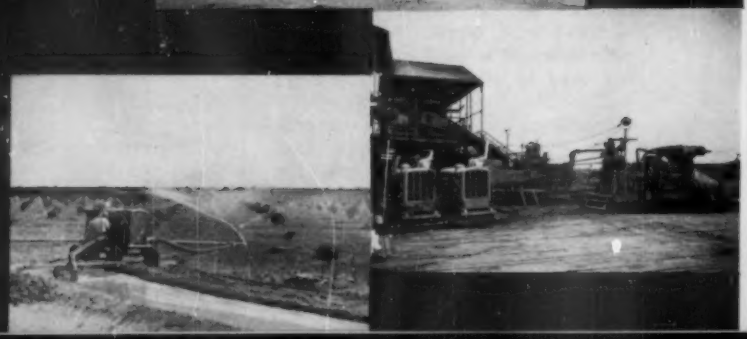

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Self-spray can helps prevent rust

... and touches up already rusted metal surfaces, thus restoring appearances and prolonging life. The spray, which comes in 16 colors plus a transparent solution, is recommended for use on pipes, fittings, tools, and equipment.

A single spray coat will be enough for most jobs, the maker reports, but where metal surfaces are badly rusted a coat of 769 Damp-Proof Red Primer should be applied over the rust and followed by the regular finish coat. **Write or call: Rust-Oleum Corp., 2799 Oakton Street, Evanston, Ill., for details on rust-prevention spray.**

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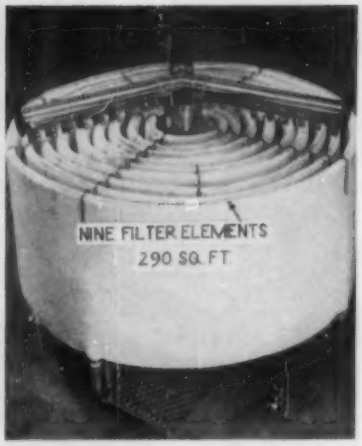

Diatomaceous earth filter

... cleans water for injection. The filter promises to prove particularly valuable for use in water-flood and disposal projects. Using a concentric-ring design, the nine-element filter for a single 54-in. unit, as shown, provides 290 sq. ft. of filter area. Spacers hold the elements apart. Each element is individually replaceable.

The concentric-ring design causes the filter aid to be evenly distributed over the septum. Rapid, thorough cleaning can be accomplished by means of backwashing and high-speed rotary jet cleaning. The filter can be dumped, backwashed, and precoated quickly, minimizing down time.

All parts of the filter element are made of either corrosion-resistant metal or synthetic materials to prevent corrosion. The interior of the welded-steel shell is protected by a cold-tar epoxy-resin coating. Gas blanketing is used to eliminate oxygen from the system. **Write or call: Baker Filtration Co., 3301 Gilman Road, El Monte, Calif., for details on BF industrial filters.**

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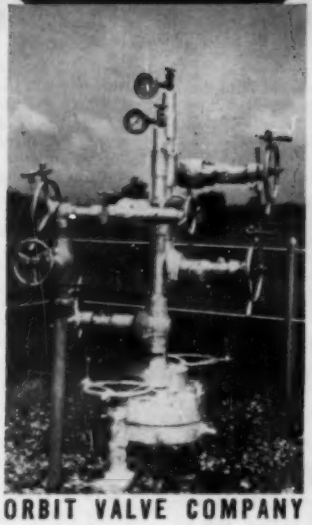

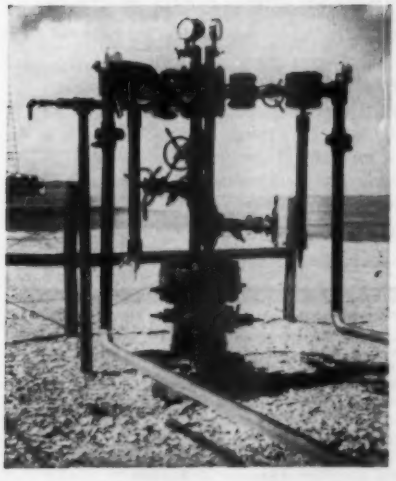

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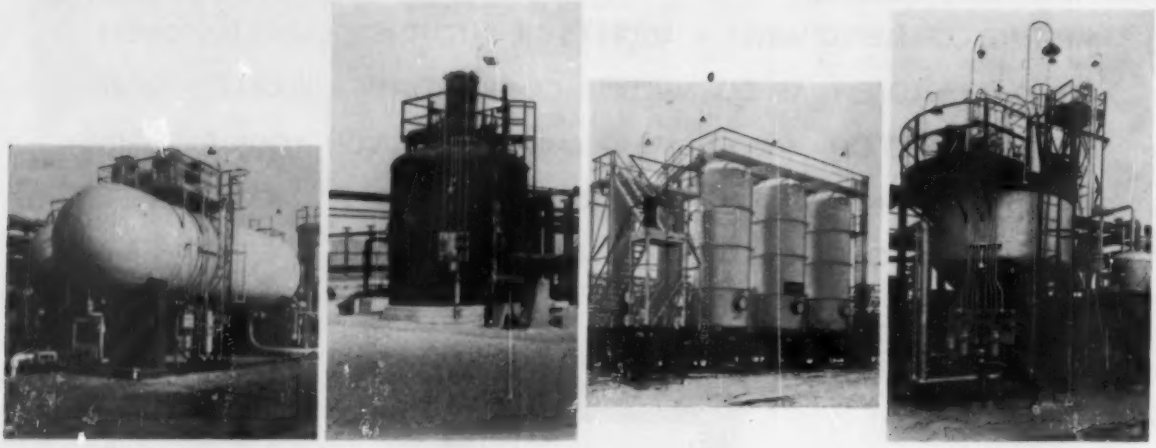

Four case histories show how PETRECO processing equipment prevents pollution*

Air and stream pollution are critical problems in refineries all over the country. The following installations show how PETRECO* Precipitation Equipment is helping to solve these pollution nuisances.

FUMES FROM OPEN TYPE ACID-LUBE AGITATORS were plaguing the residential area adjacent to a Gulf Coast refinery. PETRECO Electric Acid Lube Treating Equipment was installed. Being a closed unit, no toxic fumes escaped. The "solid" acid sludge of the former method was replaced by one that was fluid, easy to handle and simple to re-convert. Also, less acid was required to obtain a specification product and less oil was lost to sludge.

PHENOLIC WATERS FROM PHILADELPHIA AREA REFINERY were causing stream pollution problems. A PETRECO Electric Desalter was installed to purify the charging crudes. The phenolic waters were used to water-wash the salty crude. Result: the effluent from the desalter was phenol and oil free. The water pollution problem was solved.

CAUSTIC AND OIL FROM TREATMENT OF BURNING OIL were seriously contaminating the streams in a Great Lakes area. Over 8000 pounds of caustic- and oil-polluted water were being dumped every month. An ELECTROFINING* Precipitator was installed for the caustic treatment. Oil and caustic in the effluent were reduced to negligible level and the pollution problem was immediately corrected. In addition, product specifications were met at a savings of about 7600 pounds of caustic per month, because of the more intense utilization of the caustic with Petreco equipment.

CAUSTIC AND DOCTOR TREATMENT WASTES were polluting local streams and adding noxious vapors to the atmosphere near a Gulf Coast refinery. A Petreco Bender Catalytic Sweetening plant was installed. Since, in the Bender process, there is no product loss and no spent black-strap, there is no possible source of pollution. The PETRECO Processing Equipment stopped *two* kinds of pollution—air and water.

In refineries all over America, similar pollution problems are being solved daily with Petreco equipment. In the Los Angeles area, for example, one refinery is doing its part to combat the local "smog" problem with seven different Petreco installations—and, typically, producing better products at lower cost.

FOR FURTHER DETAILS on PETRECO Processing Equipment, write or call . . .

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AR 59-1

PETROLITE CORPORATION

PETRECO DIVISION

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1390 East Burnett Street (P.O. Box 7216), Long Beach 7, California

CANADA: Petreco, 4528 Stanley Drive, Calgary, Alberta

ENGLAND: Petrolite Limited, 46 Mount Street, London, W. 1

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JAPAN: Chiyoda Chemical Engineering and Construction Company, Ltd., Tokyo Bldg., No. 3, Marunouchi 2-Chome, Chiyoda-Ku, Tokyo
KUWAIT: F. N. Dahdah, Box 1713, Al Kuwait
MEXICO: R. E. Power, Sierra de Mijes, No. 125, Mexico D. F.
NETHERLANDS: F. E. C. Jenkins, Hoefbladlaan 134, The Hague
TRINIDAD: Neal and Massy, Ltd., Port of Spain, P. O. Box 544

SHOWCASE . . .

New Literature

Cyclones for catalyst recovery

. . . and other fluid-bed operations are outlined in new four-page Bulletin C-2058. It describes and illustrates design features and operating characteristics of Type SDC Duclones. The bulletin includes information on the patented Type CA trickle valve, designed as a seal for material-return diplegs in fluid-bed dust-recovery applications. **Write or call: Ducon Co., Inc., 147 East Second Street, Mineola, L. I., for Bulletin C-2058.**

Pipe and equipment insulation

. . . which is effective for temperatures up to 1,800° F. is discussed in an eight-page publication. The insulation, called Kaylo, retains an appreciable percentage of its strength even after complete saturation in water, according to the bulletin. Original efficiency returns after drying. **Write or call: Owens-Corning Fiberglas Corp., 16 East Fifty-Sixth Street, New York City, for Kaylo Insulation Bulletin.**

Bushings with new design

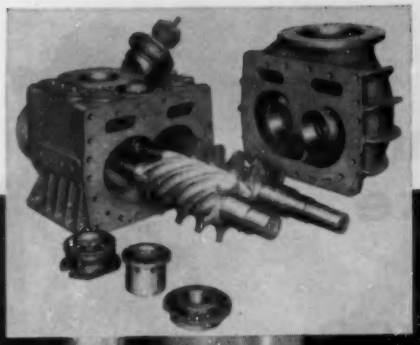
. . . for square and hexagonal kellys are described in new four-page Bulletin 495. It shows pictures of the roller assembly and includes cutaway views that give design and construction features. The bulletin covers sizes 3½, 4¼, 5¼, and 6 in. for both Type AS (square) and Type AH (hexagonal) bushings. **Write or call: National Supply Co., Two Gateway Center, Pittsburgh 22, for Bulletin 495.**

Strip-chart recorder

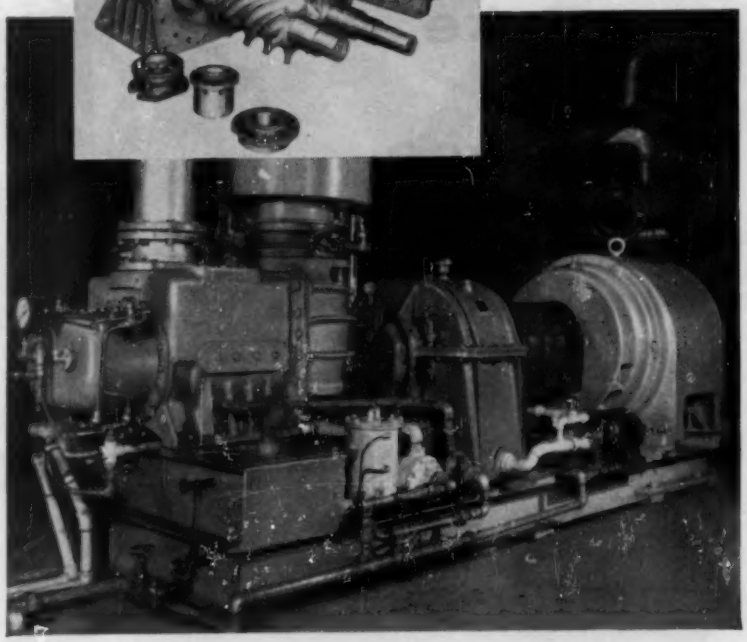
. . . with continuous integration is described in Bulletin 153-20. The new potentiometer measures, records, and totalizes the area under each peak of a chromatography spectrum, reports the four-page literature. It includes a photograph, schematic diagram, and a simulated chart record. **Write or call: Minneapolis-Honeywell Regulator Co., Wayne and Windrim Avenues, Philadelphia 44, for Bulletin 153-20.**

Fuel-oil heaters

. . . used on the suction side of pumps for heating extremely viscous fluids are discussed in a new eight-page bulletin. Two principal types cataloged are: (1) the tank suction-type heater which is installed on the tank with



On display at International Petroleum Exposition, Tulsa, Okla., May 14-23



NEW *Fairbanks-Morse Positive Displacement Axial-Flow...*

Oil-Free Rotary Compressor

for pressure, vacuum or booster service!

Here is a mechanically-simple, precision-built, high-efficiency compressor that combines the best features of reciprocating and centrifugal designs!

The new Fairbanks-Morse Axial-Flow Rotary Compressor is a two-impeller helical-lobe type machine ...ideal for a wide variety of applications...smooth in performance, adaptable to any power source. Unit weights and space requirements are impressively low.

Standard models are available in single-stage units with capacities from 800 to 12,500 cfm. at compression ratios from 1.6:1 to 5.0:1—or in two-stage units with capacities from 2,000 to 12,500 cfm. at compression ratios above 5.0:1—and for booster service at maximum working pressures up to 250 psig.

Contact your nearby Fairbanks-Morse Branch, or write Fairbanks, Morse & Co., 600 So. Michigan Ave., Chicago 5, Ill.

Ask for new Bulletin ACO 100.1.

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COMPRESSORS • PUMPS • SCALES • DIESEL, DUAL FUEL AND GAS ENGINES
LOCOMOTIVES • ELECTRIC MOTORS • GENERATORS • MAGNETOS • HOME WATER SYSTEMS

Wanna Take a Chance ?

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Specialists in the engineering and construction of heat exchange equipment

air, gas and liquid heat exchangers, coolers and heaters—finned and bare tube, evaporators, steam generators, condensers, tank heaters, air-cooled fin-fan exchangers, sea water distilling plants, helically and longitudinally finned tubing, and many other products.

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the open end of the heater extending into the tank, and (2) the line-type heater which is mounted entirely outside the tank in the pipeline. The bulletin gives complete specifications and descriptions of each type. It includes tubesheet data, materials and code pressure and temperature ratings, heater lengths, shell-nozzle orientation, nozzle sizes, ordering instructions, and dimensional data on 15 sizes of both line and tank-type heaters. **Write or call: Brown Fintube Co., 502 Huron Street, Elyria, Ohio, for Bulletin 585.**

General-purpose computer folder

. . . gives specifications, basic features, major components, and applications. Folder S-526R1 describes operation of control panel and 16-part command table. It illustrates a new optional photoelectric punched tape reader (200 characters per second), and a combination high-speed reader and punch unit. **Write or call: Data-Processing Div., Royal McBee Corp., Port Chester, N. Y., for Folder S-526R1.**

Hydraulic-set retrievable packers

. . . are detailed in a new available bulletin. The eight-page publication offers: (1) complete operating principles; (2) explanation of setting and releasing packers; (3) explanation of running and hookup procedures; (4) color schematics of setting and releasing procedures; (5) explanation and diagrams of attendant equipment, including safety joints, unions, and latch tools; and (6) discussions and schematics of dual alternate installations and equipment. **Write or call: Brown Oil Tools, Inc., P. O. Box 19236, Houston 24, for Hydraulic-Set Retrievable Packers bulletin.**

One-shot polyether catalyst

. . . for producing urethane foams is detailed in a new 20-page bulletin, yours upon request. The bulletin describes polyethers and points out foam formulation, preparation, and characteristics; machine conditions, and physical properties. It also covers polyether prepolymers and dimer acid-ester foams. **Write or call: Houdry Process Corp., 1528 Walnut Street, Philadelphia 2, for Dabco bulletin.**

Valves and controls

. . . are detailed in eight new bulletins, each presenting two pages of technical data. The bulletins are individually concerned with: (1) mechanical float

...why not try this Banking connection in oil-rich Canada?

Test it . . . try it . . . see how it works. That's the American and Canadian way of coming to a decision.

And that's why we are anxious to have you *try* our special banking services for oil and gas men before you decide on establishing a Canadian banking connection. Our experienced Oil and Gas Department in Calgary is close to all phases of this growing industry, knows trends and credit standings and qualified distributors of equipment. We can give you up-to-date facts and figures about Canada's great natural gas industry.

Whatever your banking problem or need involving Canadian oil and gas, we'd like the opportunity to help you solve it. Instead of just talking about our facilities and service, we're saying "see for yourself."

With more than 500 branches coast to coast, including all the major oil fields, "The Bank" is in a unique position to give you on-the-spot banking help and information on the oil and gas industry.

Take advantage of this demonstration offer. Get in touch with us today. Send for your copy of our map showing Western Canada's oil and gas fields and pipelines—plus Toronto-Dominion branches in the area.

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Write, call or wire Mr. W. F. Sadler
Oil and Gas Department
114 8th Avenue, W., Calgary, Alberta

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28 Broadway, New York 4, N. Y.

Servco Pilot Mills chew up 1138′ of 9-5/8″, 53-50 casing at an average milling rate of

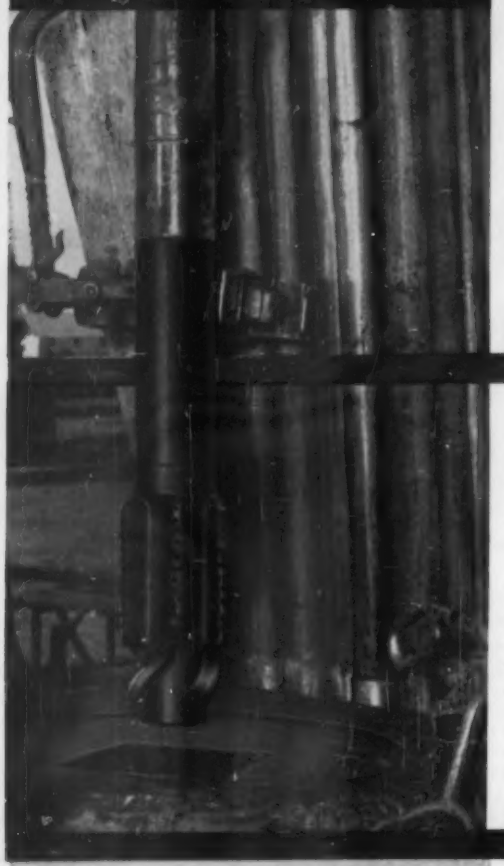
4′ per hour!

Servco Pilot Mills were put to work milling stuck casing after cut-and-pull operations had been tried with poor results. The complete milling job involved 907′ of 9⅝″, 53-50#, N-80 casing, 231′ of 9⅝″, 53-50#, P-110 casing, 7 centralizers and 1 float collar. In all, more than 61,000 pounds of shavings were produced.

These astonishing results were possible because of the use of Servcoloy*—a new, patented hard-facing material that has completely changed thinking about downhole milling. Servcoloy suspends hundreds of carbide chunks in a tough, elastic matrix which acts as a shock absorber—overcoming carbide's inherent sensitivity to shock and permitting its superior cutting quality to be utilized fully. As cutting edges are dulled or torn from the matrix, new edges are automatically exposed. Hundreds of fresh cutting edges are continuously at work, enabling remedial work which formerly took days to do to be done in hours.

Why not put these proven tools to work on your next milling job? Your nearest Servco office will give you complete details.

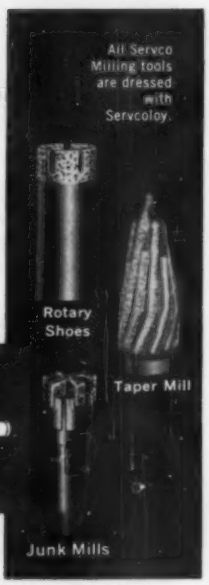
*PATENT NO. 2,833,638



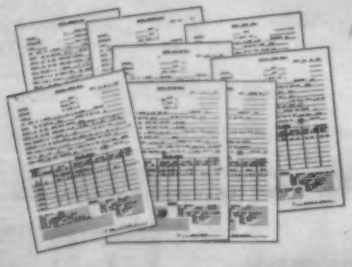
CAN YOUR PRESENT MILLING METHOD MATCH THESE SERVCOLOY RESULTS?

Csg. Wt. & Grade	Total Footage Milled	Milling Hrs.	Time Min.	Ave. Footage Milled Per Hr.	No. Mills Req'd.	Depths
7⅝" 33.70# N-80	110.5*	53	05	2.1	4	Below 12,500′
7⅝" 29.70# N-80	103**	28	07	3.6	2	Below 13,000′
7" 26# N-80	82	14	40	5.8	2	Below 10,000′
7" 26# N-80	202***	18	48	10.6	2	Below 14,000′

*Includes milling bottom half of safety joint and cross over bushing.
**22° angle directional hole.
***Includes milling rotary shoe.



Actual job records and other information will be sent upon request.



SERVCO

General Offices: 2440 Cerritos Avenue, Long Beach 6, California

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Canada: 5710—103A Street, Edmonton, Alberta
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versus power float; (2) volume-meter controls; (3) low-pressure liquid-level control; (4) low-pressure diaphragm-motor valves; (5) high-pressure liquid-level control; (6) force-balance non-bleed pilot; (7 valve and seat design; and (8) combination valve-stem packing. Related data, such as specifications, advantages, and applications, accompany each topic. **Write or call: Enardo Mfg. Co., P. O. Box 1647, Tulsa, for Technical Bulletins 1-8.**

Engine specialists can save you money

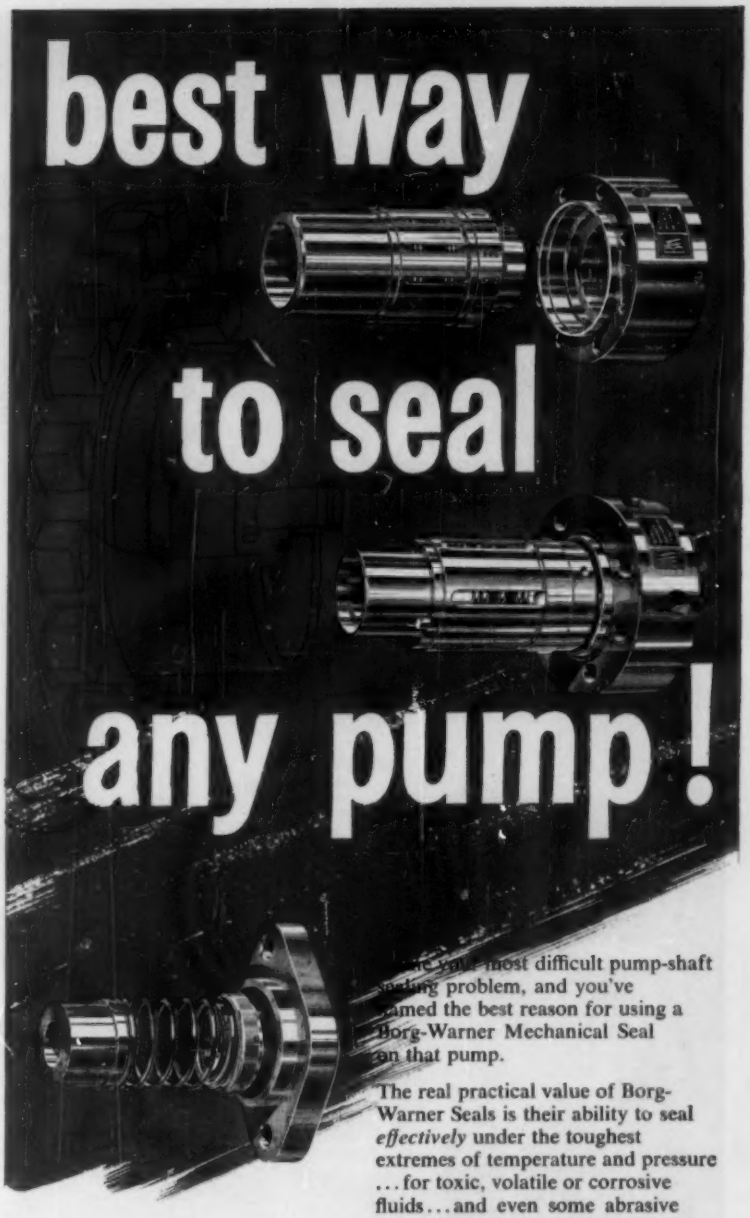
. . . as shown in new available Bulletin 20186. It describes the work of men who act as power consultants on the installation and application of diesel power. The eight-page literature gives case histories of on-the-job reports of typical diesel installations where an engine specialist helped engine owners cut costs and increase production. **Write or call: Engine Div., Caterpillar Tractor Co., 600 West Washington Street, East Peoria 8, Ill., for Bulletin 20186.**

Advantages of a new plastic pipe

. . . known as SRK are detailed in new two-page Catalog Sheet 1042. Benefits are described for both new gas-service-line installations and insertion through existing corroded lines. The sheet illustrates how to join the pipe in combination with both steel and plastic mains. **Write or call: Republic Steel Corp., Advertising Div., Republic Building, Cleveland 1, for Catalog Sheet 1042.**

Flotators and auxiliary equipment

. . . are outlined in new eight-page Bulletin SM-1003. It covers flotation systems which are designed to accomplish difficult liquid-solid separation in the recovery of byproducts from various plant streams. Through the use of dissolved air flotation, near-colloidal material with a slow settling rate is floated, concentrated, and skimmed with the floating solids, the bulletin reports. Heavy solids then settle at the bottom and are removed by a conventional raking mechanism. The bulletin illustrates with flowsheets, schematics, and photos. It describes the basic circular-type mechanisms and some of the design variations used to meet special requirements in oil and grease recovery. A pilot-plant flotator is also detailed. **Write or call: Process Engineers, Inc., 420 Peninsular Avenue, San Mateo, Calif., for Bulletin SM-1003.**



. . . most difficult pump-shaft sealing problem, and you've named the best reason for using a Borg-Warner Mechanical Seal on that pump.

The real practical value of Borg-Warner Seals is their ability to seal *effectively* under the toughest extremes of temperature and pressure . . . for toxic, volatile or corrosive fluids . . . and even some abrasive liquids. *Result*—less down time, elimination of expensive stuffingbox maintenance, and savings of the pumped fluid.

Borg-Warner Mechanical Seals

NOW AVAILABLE—a new file folder of Borg-Warner Mechanical Seal designs shows some of the many types and applications possible for pumps, mixers, autoclaves and for special rotating shaft problems. Send for your copy today—there's no obligation!

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A Stearns-Roger built productive plant
of modern concept and efficient operation is based on
your chemical process or flow sheet.
from your flow sheet to operating plant
S-R service comprises DESIGN, ENGINEERING,
PROCUREMENT and CONSTRUCTION, and includes
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equipment. Make this choice—recommended
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If Service must be Reliable, rely on S-R.
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Robert E. Manner joins

. . . the marketing department of Geophysical Service, Inc., announces J. W. Thomas, vice president in charge of marketing. Manner will assist in preparing petroleum-exploration contracts and will report to W. C. Edwards, Jr., head of the department's contracts-administration section.

Cushing is elected vice prexy

. . . of National Supply Co., in which position he'll be in charge of personnel and public relations, advertising, publicity, and related marketing activities.

George B. Cushing joined the company in 1946 as sales promotion manager. Three years ago he was promoted to director of public relations and advertising.

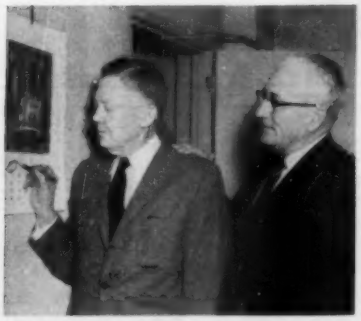
The new vice president formerly was with Westinghouse Union Battery Co. in various manufacturing, sales, and sales-management assignments. He later was sales-promotion manager for A. M. Byers Co.

National Supply is a subsidiary of Armco Steel Corp.

Glitsch opens sales office

. . . in Baton Rouge, La., to serve Alabama, Mississippi, southern Louisiana, and sections of northwest Florida.

Louis A. Venincasa, formerly located in the Dallas office of Fritz W. Glitsch & Sons, Inc., was named representative in charge of the office. He joined the company in 1956.



CIRCLING RETIREMENT DATE which marks an end to 36 years of employment with Halliburton Oil Well Cementing Co. is Elmer Lacy, former division manager at Wichita, Kans. Looking on is Hubert Northcutt, former division manager at Abilene, Tex., Lacy's replacement. Lacy started with Howco at Tonkawa, Okla. in August, 1922.

Based on "industrial campusing" concept . . .

Electronics center offers nine buildings, 146 acres

EMPLOYES OF Southwestern Electronics Co. moved into this modernistic center this month. The buildings, located on the outskirts of Houston, are equipped with a tunnel system which carries piping along with a high-voltage electrical-distribution system. Water is provided by a 600 g.p.m. well located on the property. An industrial disposal system at the site has a daily capacity of about 25 million gallons.

A two-story administrative and engineering building houses executive offices, the engineering staff, and research and development facilities. The headquarters contains acoustical ceilings and movable wall partitions for altering floor plans.

A 70,000 sq. ft. electronics assembly building contains separate pressurized rooms with controlled temperature and humidity used for the assembly of delicate instruments and precision parts. This building also provides for the manufacturing executive offices, advertising and publications, and the purchasing, quality control, and transformer departments.

A light-metal fabricating building handles both ferrous and nonferrous metal. Another unit, the customer-service building is equipped with various reconditioning, installation, and repair instruments along with training classrooms. A hydraulics and ballistics laboratory is designed for developing and testing hydraulic or propellant-activated oil tools.

SIE's heavy-machine building contains a machine shop with more than 50 turret and engine laths, jig-boring equipment, 60-in. vertical and horizontal boring mills, radial drills, hydraulic presses, shapers, mills, and grinders.

In addition, a heavy-manufacturing truck shop is equipped with metal-fabricating facilities. There are two 10-ton 70-ft. span overhead cranes in the shop's main body. A 15,000 sq. ft. repair shop for special-purpose vehicles is designed to handle fleet maintenance on a contract basis.

An integral part of the new plant facility is the 15,000 sq. ft. power center. From this location electricity, hot and chilled water, and compressed air are distributed to the entire plant for industrial uses.

BJ Service, Inc., announces

. . . six promotions and transfers within the organization. Herb Alexander, former Mid-Continent division sales supervisor, was transferred to the company's Long Beach, Calif., headquarters as executive assistant. His spot in Tulsa is being filled by J. C. Jackson, previously district superintendent at Guymon, Okla.

Other personnel affected are Floyd Long, who goes from Wichita to Guymon as district superintendent; Jack French from Pampa, Tex., to Borger, Tex., as district superintendent; Bob Tull from Guymon to Pampa

as sales representative; and Charlie Mohr from Breckenridge, Tex., to Houston as division engineer.

Ideco transfers four service

. . . representatives, according to George W. (Jack) Walton, president of the Dresser concern.

M. R. (Army) Armstrong was transferred from Beaumont to Ideco's Long Beach, Calif. office. Since joining the company in 1947, he has been with the central service department in Torrance, Calif., Dallas, and Beaumont. His 25 years of experience includes service with oil and oil-field equipment companies in both the United States and overseas.

W. W. (Pat) Patterson was moved to Denver where he will be responsible for coverage of the Rocky Mountain area and southern Canada. Patterson has been Ideco's service representative in Edmonton and Calgary since 1956.

J. E. (Ike) Challis, a company employe for 3 years, was reassigned from the central service department to the Beaumont plant as a service representative. Ted B. Bixler was transferred to the Odessa, Tex., office. He has been a service representative working out of Beaumont since joining Ideco in 1957.

Worthington Corp. shifts two

Patrick L. McManus was appointed assistant manager of the marketing division and eastern regional sales manager, announces A. W. Fraser, general marketing manager. In his new post, McManus will be located at the corporation's headquarters in Harrison, N. J.

Replacing him as manager of the San Francisco district office is William M. Fine, who for the past 5 years has been serving as manager of the Minneapolis district office.

P. L. McManus

W. M. Fine

McManus joined Worthington 23 years ago. He served in various sales capacities at the Seattle and Cleveland district offices before his appointment to manager of the San Francisco office in 1952. Fine started with the concern in 1939. He was assigned to the Chicago office as an estimator and soon became a salesman. In 1952 Fine was appointed Milwaukee branch manager and took over as Minneapolis district office manager the next year.

Otis names T. G. Garwood

. . . sales representative for Europe, Africa, and the Middle East. He will locate in Geneva, Switzerland.

Garwood, who has been with Otis Engineering Corp. for more than 20 years, has held administrative and engineering posts in the firm's Mid-Continent and Gulf Coast area branches. Prior to his new assignment, Garwood was in charge of European export sales in the company's general offices in Dallas.

J & L makes two appointments

. . . in its field-sales force, according to W. L. Wolfe, vice president in charge of sales. Newly assigned salesmen are Samuel M. Harris, Jr., at Sterling, Colo., and Phillip M. Spears at Hobbs, N. M. Both men entered Jones & Laughlin Supply Division's sales-training program in 1957.

OTIS CORROSION SURVEY SERVICES
AND A STEPPED-UP CORROSION MITIGATION PROGRAM
LET US REDUCE OUR WORKOVER COSTS
FROM $500,000 TO $179,000
ANNUALLY. HERE'S HOW WE DID IT.
FIRST, WE USED OTIS CALIPER SURVEYS — BOTH TUBING AND CASING—TO DETECT CORROSION IN OUR PIPE. FROM DATA SUPPLIED BY THE OTIS REPORTS, WE EVALUATED THE CORROSION PROBLEM IN EACH FIELD AND SET UP A REALISTIC WORKOVER PROGRAM. WE REPLACED CORRODED PIPE JOINTS BEFORE THEY CAUSED SERIOUS TROUBLE. THIS ELIMINATED MOST OF OUR EMERGENCY WORKOVERS.
SECOND, WE SCHEDULED PERIODIC OTIS CALIPER SURVEYS TO EVALUATE CORROSION INHIBITORS. WHEN WE'D CHANGE INHIBITORS, OR USE A NEW TECHNIQUE TO APPLY THEM, WE'D HAVE OTIS CALIPER EACH WELL BEFORE WE INTRODUCED THE INHIBITOR AND THEN AGAIN IN FOUR TO SIX MONTHS. THIS GAVE US A CHECK ON THE PROTECTION AFFORDED EACH JOINT OF TUBING IN OUR WELLS — FROM THE BOTTOM TO THE TOP—AND IMPROVED OUR OVER-ALL INHIBITOR PROGRAM.
HERE ARE THE PRIMARY REASONS WE PREFER OTIS' CALIPER EQUIPMENT: THEIR INSTRUMENT GIVES US A DIRECT MECHANICAL READING—LESS CHANCE OF DISTORTION. CLOSELY-SPACED SPRING-LOADED FEELERS PRESS AGAINST THE INSIDE WALL OF THE PIPE TO MEASURE THE PIT DEPTHS. AS PITS ARE ENCOUNTERED, DIRECT ACTION FROM THE FEELERS CAUSES A ROTATING STYLUS TO PLOT THE PIT DEPTH AND LOCATION ON A METAL CHART WITHIN THE TOOL.

Joe P. Pavlich is appointed

. . . district engineer for Dowell Division of The Dow Chemical Co. at Houston. He transfers from Hobbs, N. M., where he has been a petroleum engineer for the company since 1956.

In his new assignment, Pavlich will direct the company's engineering activities in the oil and gas fields along the Texas Gulf Coast. He will locate at Dowell's Houston district offices.

Barnett elected vice president

. . . in charge of sales of Jas. P. Marsh Instrument Co. and company affiliates.

Robert E. Barnett formerly was sales manager of the Skokie, Ill., firm and has been with the company for 18 years.

Macobar sets up a new plant

. . . at Appleton, Wis., for the production of Spersene, a new thinner for drilling muds, reports Orien Van Dyke, senior vice president, production and technical, of Magnet Cove Barium Corp.

The plant, a joint venture between Macobar and Consolidated Water Power & Paper Co., consists of a processing section and a storage warehouse. Spersene is being produced by chemical processing of concentrated lignin liquor derived from a papermaking operation.

John E. O'Connor is made

. . . technical sales representative in the New York district by Wolverine Tube Division of Calumet & Hecla, Inc. The announcement comes from Fred F. Moore, New York district sales manager. O'Connor's territory will cover New York state, a section of New York City, and part of northern New Jersey.

C. W. Hopkins named manager

. . . of U. S. Steel Supply Division's Dallas warehouse, reports H. C. Swain, manager of the Houston district of the company's warehousing and distribution unit.

Hopkins joined the firm's American Steel & Wire Division in Dallas as a sales clerk 32 years ago. He was assigned to the Houston office of Tennessee Coal & Iron Division and returned to Dallas as a salesman in 1948. He started with the Supply Division in 1953 and was named field supervisor 2 years ago.

Norman K. Tschirley is named

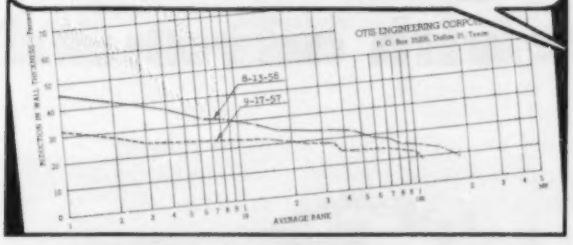
. . . technical sales director of Baroid-Maffei S.p.A., a new company organized to supply drilling-mud products to the Mediterranean and Persian Gulf areas. He will headquarter in Milan, Italy. Tschirley was assistant chief drilling-mud engineer with Baroid Division of National Lead Co. in Houston prior to his appointment. Before that he worked as research assistant in Phillips Petroleum Co.'s Bartlesville, Okla. laboratories. He joined Baroid in 1949 and was made assistant chief drilling-mud engineer 2 years ago.

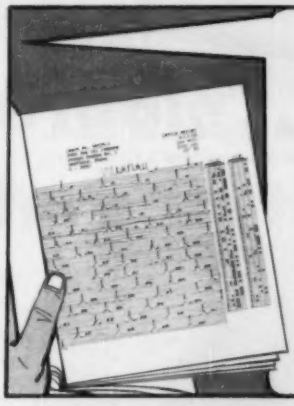
Rustom & Hornsby, Ltd. shifts

. . . staff personnel within the English firm's engineering departments.

P. L. Johnson was appointed manager of technical services; J. K. Bellamy is the new engineer in charge of small engines; L. H. Milsom takes over as assistant chief engineer of current engines; A. M. Porkess was named assistant chief engineer of medium-speed engines; L. Stubbs was appointed engineer in charge of loco-

BESIDES LOCATING AND REPORTING DAMAGE TO PIPE THAT WILL CAUSE IMMEDIATE TROUBLE, OTIS' CORROSION REPORT ALSO INCLUDES A "PIT DEPTH RANK CHART" WHICH RANKS THE PIPE JOINTS ACCORDING TO THE DEGREE OF CORROSION DAMAGE DETECTED. THIS CHART ENABLES US TO EVALUATE OUR CORROSION CONTROL PROGRAM, AND HELPS US ANTICIPATE WORKOVERS AND PIPE REPLACEMENT REQUIREMENTS.





WE BELIEVE THE OTIS CALIPER SURVEY REPORT IS THE MOST COMPLETE WE CAN GET. IT INCLUDES — (1) A WRITTEN INTERPRETATION OF THE CALIPER CHARTS; (2) ENLARGED PHOTOCOPIES OF THE ORIGINAL METAL CHARTS TAKEN FROM THE CALIPERING TOOL; (3) A JOINT-BY-JOINT CLASSIFICATION SHEET, AND (4) THE PIT DEPTH RANK CHART. WHAT'S MORE, WE KNOW WE CAN RELY UPON THE INTERPRETATION GIVEN EACH OTIS CALIPER SURVEY.

THERE ARE OTHER WAYS YOU CAN USE OTIS' CALIPER SERVICE TO REDUCE WORKOVER COSTS. HAVE OTIS CALIPER PIPE IN THE YARD SO THAT YOU CAN SEGREGATE THE JOINTS FOR DIFFERENT USE. HAVE OTIS RUN ROD WEAR SURVEYS — AND CALIPER OLD PRODUCING WELLS YOU PURCHASE TO DETERMINE THE CONDITION OF THE PIPE, AND TO LOCATE SUB-SURFACE EQUIPMENT IN THE WELL.

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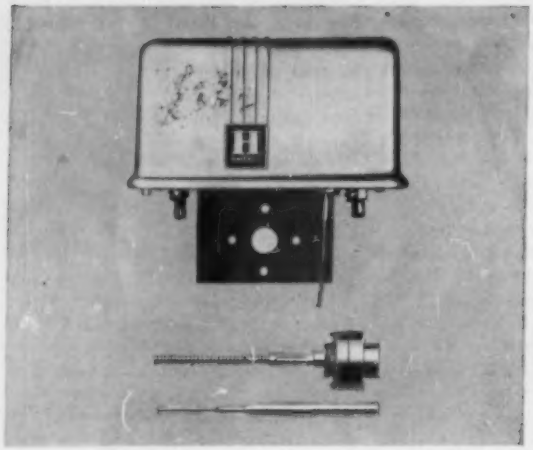

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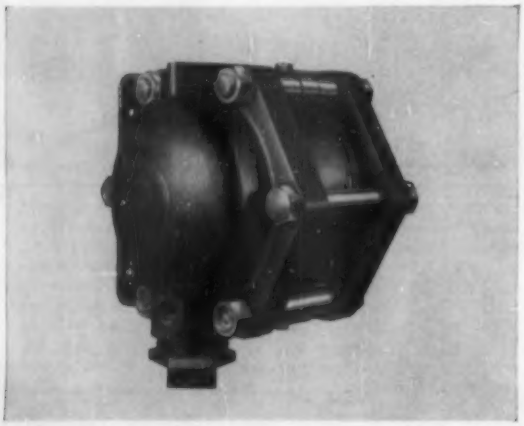

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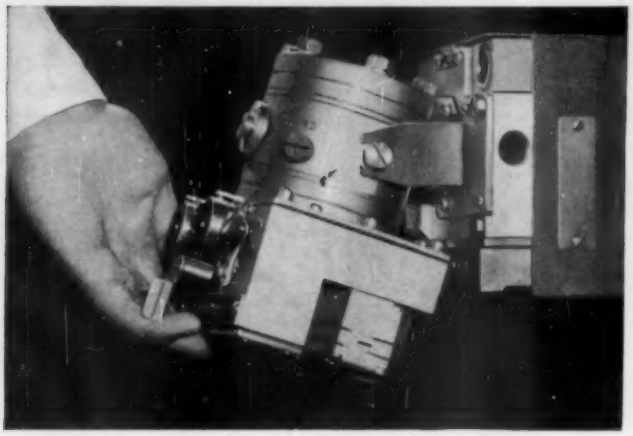

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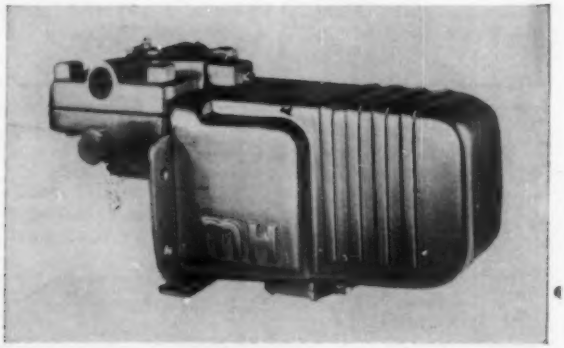

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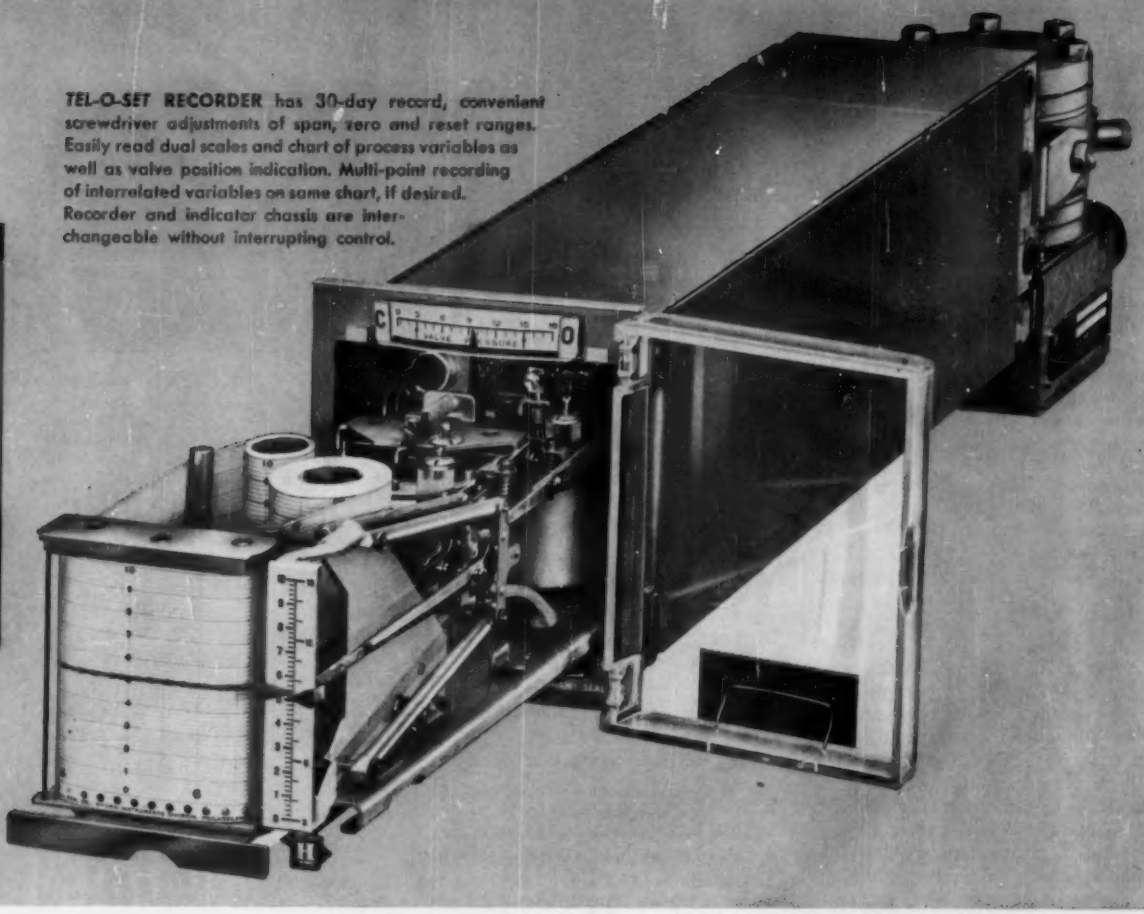

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motives and gears; and H. Bayes assumes the job of engineer in charge of marine applications.

Paul L. Patterson is named

. . . sales representative in the Houston area by Frank Wheatley Supply Co., according to Huber Dye, sales manager.

Patterson comes to Wheatley after 8 years with the industrial division of Goodyear Tire & Rubber Co. in Lubbock and Odessa, Tex., and Tulsa. Before that he was with Thermoid Co. in Houston.

Ray R. Sloan joins

. . . Ben F. Kelley Co., Inc., of Tulsa, as a sales engineer.

Sloan began his oil-industry career with Oklahoma Iron Works, where he became chief draftsman. Two years later he started with Twin Disc Clutch Co. as a field representative. In 1929 he returned to Tulsa as sales manager of Buda Engine Sales Co.

From 1939 until his retirement last year, he was a field representative for the engine division of Caterpillar Tractor Co. In 1942 he was transferred to Caterpillar's expediting department in Peoria, Ill., and returned to the engine division the following year. He spent the next 5 years in charge of a distributor training program and in 1957 was transferred to Billings, Mont.

Garrett names Fred L. Magoon

. . . administrative engineer in charge of research projects in the firm's home office and plant at Longview, Tex.

Twenty-three attend Drilco Oil Tools regional sales meeting . . . in Midland, Tex. Seated, from left, are Al Shipman, Marvin Peck, Donald S. Morris, J. B. (Doc) Long, Evelyn Aiken, Bert Fairchild, Bill Garrett, Glenn Chance, Bob Price, and J. M. (Cotton) Wigley. Standing, from left, are Dick Norton, Bill Williams, Gene Wyatt, V. V. (Joe) Hibler, Stanley C. Moore (Drilco president), Fred Dallas, Don Millison, Bill Bachman, H. M. Rollins, Scarbrough Hartley, Jimmie Richardson, Fred Scott, and Rex Everett.

Magoon comes to Garrett Oil Tools, Inc., from Fibercase Co.—a division of Youngstown Sheet & Tube Co.—where he was chief engineer for 8 years. Before that he was with Perrault Bros., Inc., of Tulsa.

G. B. Hanson made vice prexy

. . . in charge of sales of Liquid Mud, Inc., according to David A. Rowe, president. Hanson formerly was service supervisor with Baroid Division of National Lead Co.

Liquid Mud., Inc., under the supervision of Hanson, plans an expanded sales and service program with complete barge facilities and engineering services for marsh drilling the Gulf Coast area.

Petroleum Technologists opens

. . . a new laboratory in Santa Barbara, Calif., to serve offshore oil operators, announces Dr. Norris Johnston, president of Petroleum Technologists, Inc.

The lab is managed by Robert O. Albert, who was transferred from the company's Montebello facilities. Albert has had more than 8 years of field and laboratory-analysis experience.

Ladish Co. establishes new

. . . Dallas sales office. W. F. (Bill) Brockwell and R. O. (Bob) Barlen were named to represent the Cudahy, Wis., firm in the Dallas area.

William L. Glover is appointed

. . . area sales engineer for Larkin of Butler (Pa.), manufacturers of oil and gas-well production equipment and water-well drilling tools and supplies.

At his new post, Glover will work out of Belpre, Ohio, and will cover the states of Ohio, West Virginia, and eastern Kentucky. He was formerly sales and service engineer for Baker Oil Tools, Inc.

Mid-Continent Supply named

. . . to distribute oil-field products of Enardo Mfg. Co. The Fort Worth, Tex., supply company will handle Enardo products throughout the United States and Canada.

Stanley S. Scott is assigned

. . . to the Houston district of Allis-Chalmers Industries Group as a sales representative. He joined the firm in 1953 and since then has been an application engineer in A-C's compressor department.

Carroll J. Green is promoted

. . . to district representative in charge of Sperry-Sun Well Surveying Co.'s Lafayette, La., office. Green, who has been with the company since September, 1955, previously served as field salesman.

Milwhite Mud Sales Co. opens new plant at Algoa, Tex.

The plant contains modern, pneumatic mud-handling equipment and features a radio system which covers the entire Gulf Coast area with nine scattered base stations. All service engineers' cars are radio equipped. Sets are also available for installation on drilling rigs.

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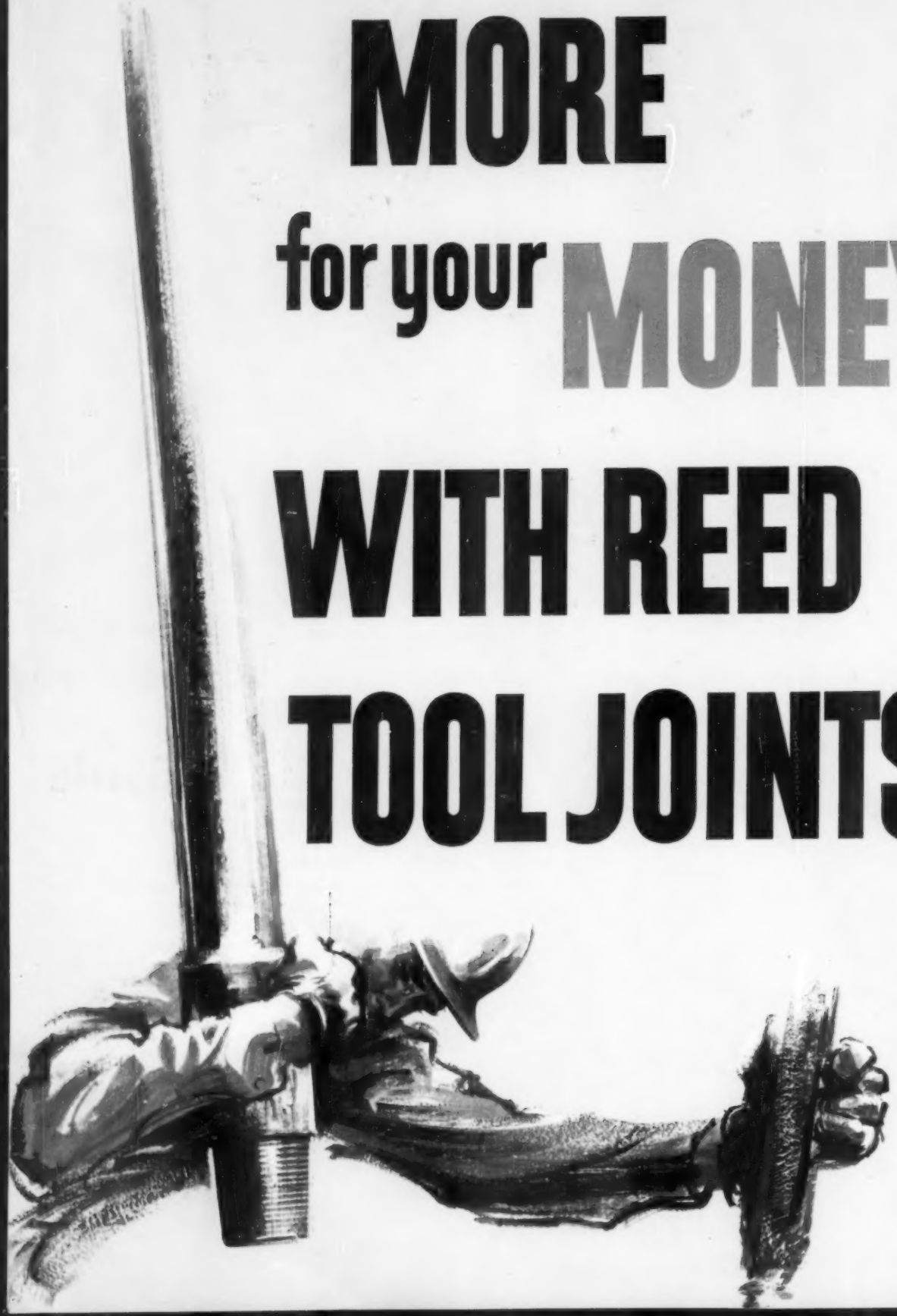

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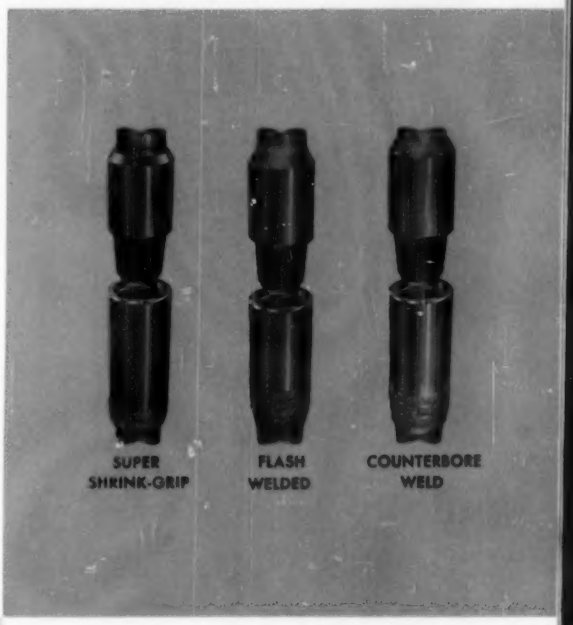

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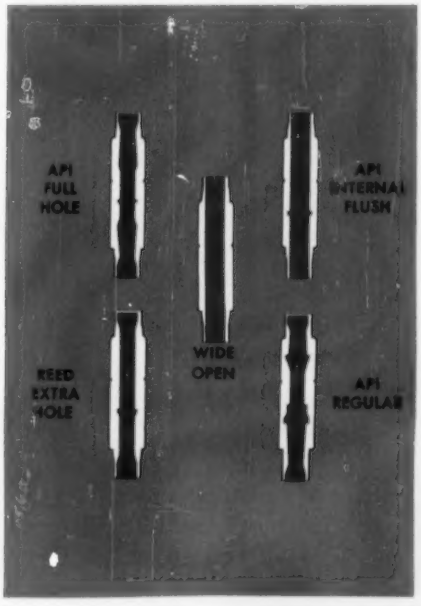

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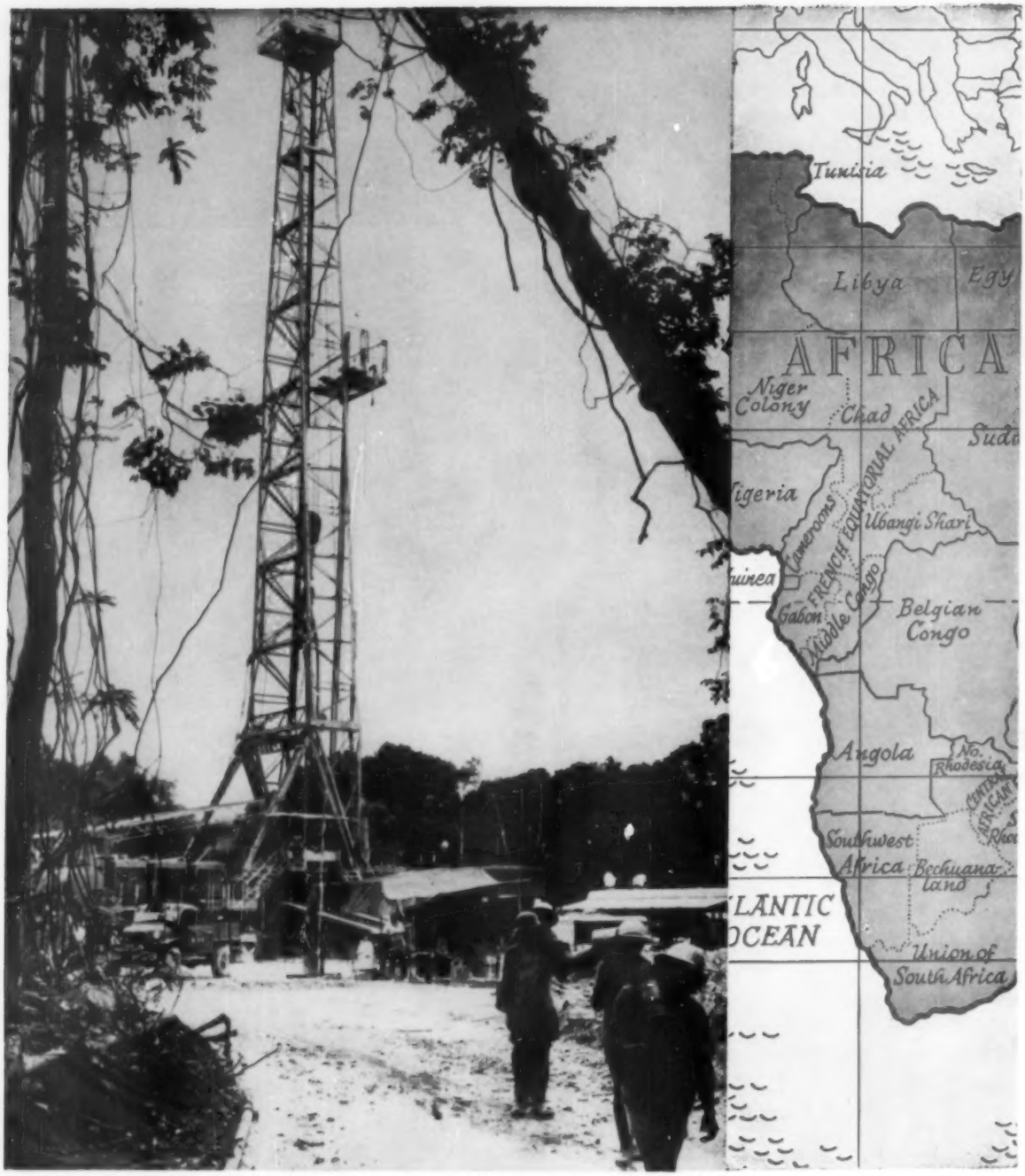

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DENDRITIC TONGUES of porosity spread slowly over the map as . . .

Crane trend caprices still puzzle geologists

BY FRANK J. GARDNER

ONE OF THE most baffling traps ever found in this country snakes across the Texas-Louisiana state line. After 11 years of steady growth and remarkable productivity, the field is still a riddle to geologists in the area.

This strange trap, for lack of a better name, has been christened the Crane trend. Today it's 52 miles long and 18 miles across at its widest points. And it still isn't defined. The width figure, incidentally, is over-all since there are bands of nonproductive area between the several tongues along the trend (see map); the average width of each individual tongue is 3 to 4 miles.

This enigmatic trap is simply a long, narrow band of porosity, completely divorced from any structural influence. The first well was finished in 1948; this was Hollandsworth Oil Co. 1 Crane in northwestern Panola County, Texas. It came in for an initial potential of 36 million cubic feet of gas daily plus 1,152 bbl. per day of 63°-gravity condensate from a depth of 6,538-60 ft.

An unexplainable trap . . . In a new publication by the Shreveport Geological Society entitled "Reference Report on Certain Oil and Gas Fields—Volume IV," Geologist J. L. Nichols, of Gulf Oil Corp., summarizes the growth of the Crane trend as part of a major article on Sligo-Lower Cretaceous stratigraphy. Author Nichols has this to say: "The Crane zone development has been one of the richest in return to the operators and also one of the most baffling to explain. Since the stratigraphic trend has disregarded the accepted anticlinal theory, the major companies have been hesitant to join the play. Most of the major companies have hesitated because of the geologist's inability to explain adequately the concept concerning the trend."

Calls for gamblers . . . Over the past 11 years, venturesome independent operators have done most of the drilling on the Crane trend. It takes a spirit of adventure to gamble $70,000 to $75,000 on a wildcat, but when your own geologist admits extreme puzzlement as to the well's chances, then the gamble is compounded indeed. But it is from such a spirit of chance-taking that the trend has grown as much as it has.

Here's an excellent example of the challenge presented to explorationists by the stratigraphic trap. Here the only tool is the drill, which if used often enough, produces a second important tool—the subsurface well log. No geologist could have foreseen the growth of such a strange field.

And subsurface specialists . . . East Texas geologists have acquired some deftness at spotting extensions of the trend. By using logs, cross-sections, pressure maps, test data maps, isopachs, and sand limit maps they are able to predict pretty well in advance the outcome of the next stepout well.

An isopach map prepared by Nichols for the Shreveport society's reference book shows a net thickness averaging 8 ft. for the Crane pay, and a maximum of 20 ft. in one area. Some wells show as little as 2 ft. of porosity. By use of cross-sections the author shows there is no relation whatever between accumulation in the Crane zone and structural conditions. Accumulation depends entirely upon a transition from porosity to nonporosity on the flanks of the trend. The productive pay is an oolitic lime with very fine shell fragments.

More than 400 rich gas-condensate wells have been finished as Crane-zone producers, and drilling activity shows no letup. Acidization is the standard procedure in completion, and potentials range from 30 million to more than 200 M.M.c.f.d. The distillate content is generally high, ranging from 60 to 97 bbl. per M.M.c.f.

All in all, the existence of the rich Crane trend is a great tribute to those involved in its development. If you can imagine aiming the bit at an erratic, narrow belt of oolitic pay as little as 2 ft. thick, at a depth of 5,000 to 6,000 ft., with no structural evidence to go on at all, then only can you appreciate the imaginative thinking that has been going on in northeastern Texas the past decade.

It must certainly have involved a lot of geological salesmanship as well, for, as Author Nichols points out in his fine article, more independent operators have been sold on the idea than corporation boards of directors. This is a forward step in oil finding, since most of our oil reserves have been found by independents. If they can be sold on stratigraphic entrapment, then we have little to fear about future exploration for strat traps. Certainly these will yield most of our future oil and gas.

Here is a practical way to determine . . .

The cost of finding oil

A petroleum economist declares:

About the only thing the public knows about producing oil companies is that they make profits. Many companies are unable to tell where these profits originate, because of their inability to allocate costs. Profits may be coming from older fields, but this is difficult to express quantitatively. The petroleum industry needs more facts.

ROBERT E. MEGILL is senior economist and head of the exploration-economics section of the economics department for Carter Oil Co., Tulsa. His duties include evaluating exploration areas from historical data and analyzing cost trends of the producing industry.

MOST BUSINESSES know what their costs are. Plants can be built, products made, and a cost per product determined. But the oil industry is not quite so fortunate. Spending money in exploration does not guarantee finding oil. If oil is found, the quantity is not immediately known, and seldom is the cost of finding per barrel known soon enough to have its proper influence on current decisions.

One of the vital facts which the industry needs to know is its cost of finding oil. Only by comparing the amount of money spent looking in an area to the barrels found in that area can the industry judge the efficiency of its exploration program. Very little has been published on the finding costs of the petroleum industry prior to the expenditure summaries released by the Joint Survey in 1955.[1] It is possible, however, to calculate the amount of money the industry is spending in the search for oil and gas, and this article outlines such a method. A method will also be described for estimating the number of barrels found.

The economics department of Carter Oil Co. has been calculating finding costs by areas for several years. The purpose has been to establish current costs of finding and trends in finding costs. Such analyses provide an additional tool for exploration management.

Reserves

Many people in determining the costs of finding oil use the API reserve additions as indicative of barrels found. If a very long period is considered, this is reasonably accurate, but the disadvantages on a short-range basis are many. For example, reserve additions resulting from water-flood projects in old reservoirs are not a result of current exploration; they should be credited to earlier exploration programs. Waterflood reserve additions cannot be segregated in using API data. Similarly, major revisions (up or down) in old fields are not a result of current exploration efforts. These changes also cannot be isolated from API data.

The results of current exploration programs can be determined only by considering the new reservoirs found during the period. Finding expenses should be related to the barrels of oil found in these reservoirs. Determining the proper barrels to relate to current costs necessitates adding to current reserve data an estimate of future reserve additions. The method of estimating reserves in this analysis is as follows:

1. All petroleum reservoirs are separated by year of discovery.
2. Current estimates of reservoirs are tabulated by year of discovery.
3. Current estimates are statistically corrected for future reserve additions, both primary and secondary.

This method adjusts the barrels found and developed to a probable final basis.

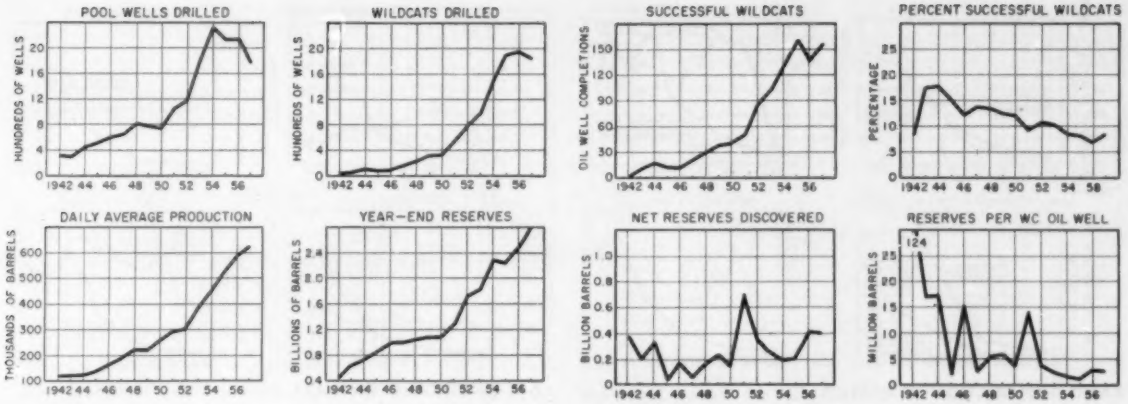
To calculate the cost of finding in a specific area, the basic exploration facts must be assembled. These include the number of employed geologists, the amount of geophysical work performed, the number of employed scouts, the undeveloped acreage holdings, and the number and average depth of dry holes.

Geological costs can be calculated by multiplying the number of employed geologists by the cost per year to arrive at total geological cost. The number of employed geologists can be estimated from the AAPG membership list.[2] Total seismograph cost can be estimated by multiplying the cost per crew month by the number of crew months worked. Scouting costs are estimated in the same manner as geological costs.

Using drilling-cost data published

MOST of the statistics in this study are based on oil-finding costs in this Rocky Mountain area. Fig. 1.

Presented at the 44th annual meeting of the AAPG in Dallas, March 17, 1959.



DRILLING, production and reserves in Rocky Mountain area. (See Table 1) Fig. 2.

DISCOVERY DATA for Rocky Mountain area show decline in success rate. (See Table 2) Fig. 3.

by the Joint Survey,[3] the cost of dry holes can be estimated. Acreage holdings have been published for the IPAA[4] and other sources.[5 6] From these holdings, the number of acres acquired and leased are estimated. Surrendered lease cost, annual rentals, and leasing costs are determined by multiplying cost per acre factors times the appropriate acreage.

This is the technique used to estimate the cost of finding for a given area. Basically, it is the application of dollar costs to various physical factors that can be estimated or measured in a particular area.

These costs include money spent looking for gas. No attempt is made here to allocate costs for gas found. There is no general agreement in the industry on how this should be done. Those interested in correcting these costs can apply their own allocation techniques to the total dollars spent. Such a correction is obviously more important in some areas than others. Meanwhile, it must be remembered that the cost per barrel numbers quoted here are slightly high by whatever amount would be allocated to gas. Such allocation, however, will not affect the general conclusions of this work concerning the trends in finding costs.

Before showing you the cost of finding for the interior U.S., this technique will be explained in somewhat more detail by reviewing briefly the cost of finding and basic exploration statistics for the Rocky Mountain area.

Rocky Mountains

The area included in the analysis is shown on Fig. 1; it includes most of the Rocky Mountain producing area.

On Fig. 2 some brief statistics about the area are shown. Pool wells, wildcat wells, production, and reserves are shown for the period 1942 through 1957. The effect of recent intensified exploration in this area is clearly indicated on all of the four graphs. Denver basin activity (1950-53) was followed by activity in the Williston basin (1952-56) with current interests switching to the Paradox basin.

Pool drilling peaked in 1954 with almost 2,400 completions; 1957 completions totaled about 1,800 wells. Wildcat wells peaked in 1956 and

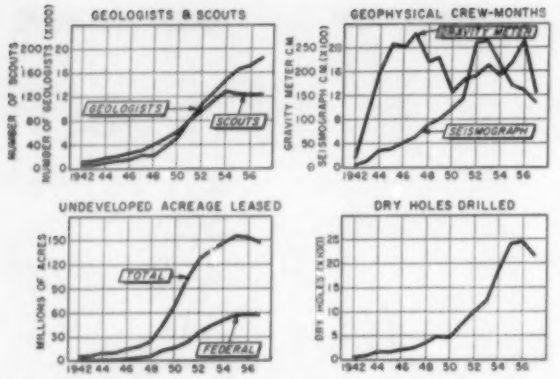
TABLE 1—DRILLING, PRODUCTION AND RESERVES—ROCKY MOUNTAINS

	Pool wells drilled		Wildcat wells drilled		Daily avg. production, 1,000 bbl.	Year-end reserve, 1,000,000 bbl.
	Total	Oil	Total	Oil		
1942	316	213	37	3	120	428
1943	293	234	62	11	120	641
1944	443	350	105	19	122	739
1945	504	388	78	12	136	849
1946	598	425	93	11	163	994
1947	646	467	151	21	189	1,003
1948	826	615	211	29	224	1,047
1949	781	514	310	39	222	1,074
1950	749	514	333	41	261	1,069
1951	1,056	739	537	50	297	1,292
1952	1,173	819	790	87	305	1,727
1953	1,799	1,316	972	103	390	1,843
1954	2,343	1,728	1,530	133	456	2,303
1955	2,133	1,325	1,905	162	530	2,250
1956	2,151	1,359	1,956	136	597	2,474
1957	1,767	1,124	1,856	155	630	2,790

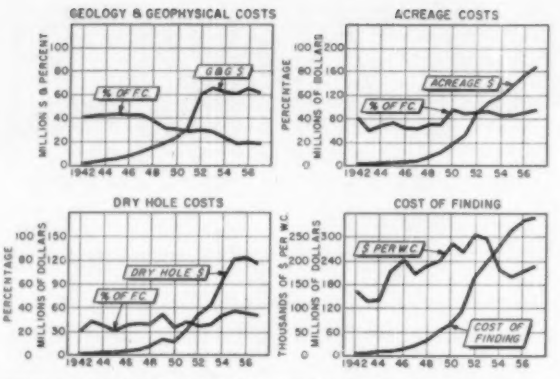
TABLE 2—DISCOVERY DATA—ROCKY MOUNTAINS

	Wildcat oil-well comp.	Per cent oil wells	Net reserves discovered*	
			Total	Per wildcat oil well
1942	3	8.1	372	124.0
1943	11	17.7	187	17.0
1944	19	18.1	329	17.3
1945	12	15.4	19	1.6
1946	11	11.8	170	15.5
1947	21	13.9	44	2.1
1948	29	13.7	164	5.7
1949	39	12.6	239	6.1
1950	41	12.3	141	3.4
1951	50	9.3	703	14.1
1952	87	11.0	341	3.9
1953	103	10.6	231	2.2
1954	133	8.7	182	1.4
1955	162	8.5	195	1.2
1956	136	7.0	414	3.0
1957	155	8.4	405	2.6

*Millions of barrels (primary).



BASIC EXPLORATION STATISTICS for the Rocky Mountain area. (See Table 3) Fig. 4.



COST OF FINDING OIL DATA for the Rocky Mountain area. (See Table 4) Fig. 5.

were at about the same level in 1957 —1,800 wells. Production in 1957 at 630,000 bbl. per day was six times what it was in 1942; remaining reserves at year-end 1957 were seven times the 1942 level.

On Fig. 3, discovery data are shown for the Rocky Mountain area. Successful wildcats increased from less than 10 to 150 wells per year by 1955. Since 1943-1944, there has been a gradual decline in the success rate; the current level of 7½% is a decrease from the high of 18% in 1944. At the same time, crude-oil reserves discovered per wildcat oil well have decreased. The average size of discoveries was 10-15 million barrels in the early 1940's; since 1953, the average successful wildcat has found 2,500,000 bbl. However, because of the increased number of wildcats drilled, the amount of reserves per year has been trending upward since 1944. Since 1942, over 5,000,000,000 bbl. have been found in the Rocky Mountains.

TABLE 3—BASIC EXPLORATION STATISTICS—ROCKY MOUNTAINS

	Year-end acreage total*	Undeveloped holdings, federal*	Number of		Geophysical effort (crew-months)	
			Geologists	Scouts	Seismograph	Gravity meter
1942	5.6	1.9	108	7	40	22
1943	5.9	2.2	139	8	112	109
1944	8.6	2.4	171	13	283	202
1945	10.5	2.7	199	16	315	261
1946	13.9	3.8	243	17	393	252
1947	17.0	5.6	287	24	499	284
1948	24.1	7.1	394	24	696	222
1949	46.4	13.9	495	37	794	230
1950	69.9	17.3	600	54	949	153
1951	105.4	24.0	807	83	1,150	183
1952	126.9	36.8	1,082	97	2,087	193
1953	137.1	45.9	1,281	114	2,120	215
1954	146.8	51.3	1,481	131	1,710	192
1955	155.3	56.8	1,655	126	1,361	220
1956	154.1	58.4	1,726	125	1,281	264
1957	148.0	58.0	1,839	125	1,072	154

*Millions.

TABLE 4—COST OF FINDING DATA—ROCKY MOUNTAINS

	Dry holes	Cost of finding ($1,000,000) G & G*	(%)	Acreage	(%)	Dry holes	(%)	Total	Cost of finding† ($1,000)
1942	64	2	40	2	40	1	20	5	135
1943	89	3	42	2	29	2	29	7	113
1944	157	5	42	4	33	3	25	12	114
1945	143	6	43	5	36	3	21	14	179
1946	185	8	42	6	32	5	26	19	204
1947	236	11	42	8	31	7	27	26	172
1948	343	15	38	14	35	11	27	40	190
1949	476	19	31	22	35	21	34	62	200
1950	461	24	30	37	47	18	23	79	237
1951	737	32	28	52	44	32	28	116	216
1952	991	60	30	90	45	51	25	201	254
1953	1,221	66	28	109	46	63	26	238	245
1954	1,861	63	23	119	43	96	34	278	182
1955	2,398	61	19	136	43	122	38	319	167
1956	2,445	65	19	154	45	125	36	344	176
1957	2,147	62	18	169	48	117	34	348	188

*Geology and geophysics. †Per wildcat drilled.

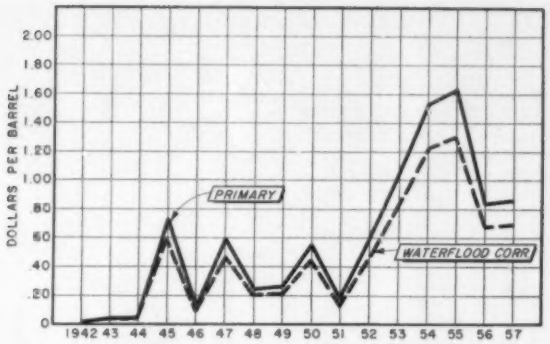
Basic exploration statistics for the Rocky Mountain area are shown in Fig. 4. The number of employed geologists and scouts has increased tremendously in the area since 1942. At present, there are almost 2,000 geologists working in the Rocky Mountain area, with over 120 scouts employed.

Seismograph crew-months increased gradually to 1951 when 1,200 crew-months were performed. The discovery of oil in the Williston basin jumped seismograph activity to 2,100 crew months in 1952 and 1953. Since that time, crew months have declined to the 1951 level. Gravity meter work reached a peak in this area in 1947 at 275 crew months. Another peak was reached in 1956, but in general gravity-meter work in this area is declining.

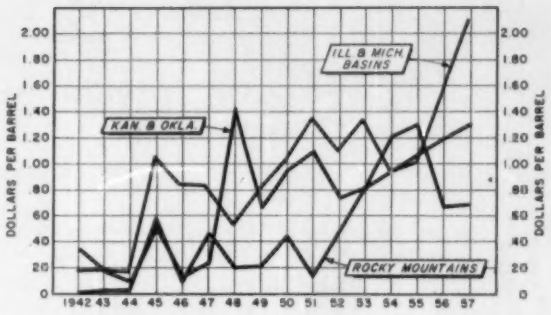
Following a rapid increase in exploratory activity after 1950, acreage holdings reached a peak of a 150,000,000 acres in 1955; in the Rocky Mountains 1 out of every 3 acres held is a federal lease.

With increased drilling, the number of dry holes increased. Dry holes peaked at about 2,500 in 1956 and declined in 1957.

When the basic statistics are converted to dollars, the results are as shown on Fig. 5. The petroleum industry in the Rocky Mountains is currently spending $60 million per year on geology and geophysics. This



COST OF FINDING OIL, per net barrel, in Rocky Mountains. (See Table 5) Fig. 6.



COST OF FINDING OIL, per net barrel, with primary and secondary recovery. Fig. 7.

is 20% of the cost of finding. Acreage costs amount to about 40% of the cost of finding and now total $160,000,000 per year. Much of this is in rental costs which are increasing as each area is leased the second time. Dry-hole costs amounted to $120,000,000 per year in 1955, 1956, and 1957—almost 40% of the cost of finding. The total amount of money spent looking for oil in the Rocky Mountains reached a peak in 1957 of about $350,000,000. This is a cost per wildcat of almost $200,000, or at a 7½% success rate $2,500,000 per successful wildcat.

These dollars compared to the net barrels found provide a cost of finding per barrel, as shown on Fig. 6. Finding costs per barrel in the Rocky Mountain area are among the lowest in the U.S., but have increased significantly since 1946, with a peak in costs in 1954-55. In 1957, finding costs were about $0.70 per barrel, including a correction for future waterflood reserves.

The money spent in any one year looking for oil or gas may have only an indirect relationship to barrels found. Some leases bought today will be drilled in subsequent years. Some of the prospects uncovered by geologists and geophysicists will be drilled later. However, by considering a 16-year period, the finding-cost trend can be established.

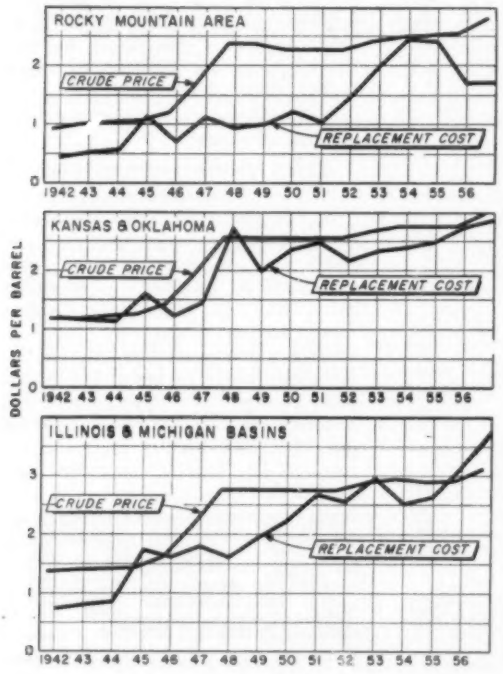
The yearly cost of finding oil, primary and secondary, is shown for three areas on Fig. 7. These areas comprise most of the interior U.S. They are Kansas and Oklahoma,[7] the Illinois and Michigan basins,[8] and the Rocky Mountain area. At the present time, the Rocky Mountain area has the lowest finding cost of the three areas. Finding costs were about $2 per barrel in 1957 for the Illinois and Michigan basins, $1.30 per net barrel in Kansas and Oklahoma, compared to $0.70 for the Rocky Mountains. The average cost of finding for the entire period and for the last 5 years for the areas are as follows:

COST OF FINDING PER BARREL

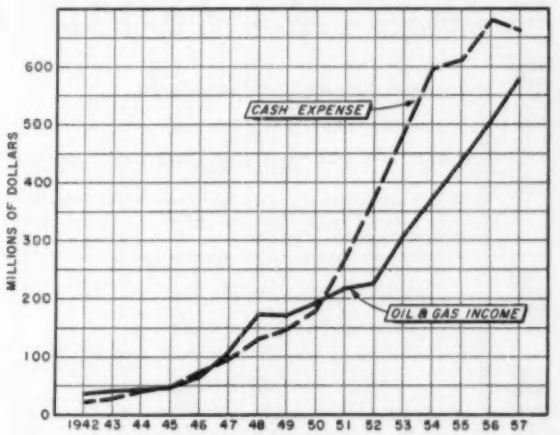
Area—	$ per net bbl. 1942-57	$ per net bbl. 1954-57
Kansas-Oklahoma	0.57	1.04
Illinois-Michigan basins	0.70	1.26
Rocky Mountains	0.41	1.07

Replacement Costs per Barrel

By making additional calculations of development and operating costs of the areas, an interesting comparison can be made between replacement



REPLACEMENT COST of oil per net barrel, in three producing areas. (See Tables 6 and 7) Fig. 8.



INDUSTRY CASH POSITION for the Rocky Mountain area. (See Table 8) Fig. 9.

TABLE 5—COST OF FINDING PER BARREL—ROCKY MOUNTAINS

	Net barrels found*	Cost of finding—Total†	Cost of finding—Per net barrel—Primary	Cost of finding—Per net barrel—Primary and secondary
1942	372	5	$0.01	$0.01
1943	187	7	0.04	0.03
1944	329	12	0.04	0.03
1945	19	14	0.74	0.59
1946	170	19	0.11	0.09
1947	44	26	0.59	0.47
1948	164	40	0.24	0.20
1949	239	62	0.26	0.21
1950	141	79	0.56	0.45
1951	703	116	0.17	0.13
1952	341	201	0.59	0.47
1953	231	238	1.03	0.82
1954	182	278	1.53	1.22
1955	195	319	1.64	1.31
1956	414	344	0.83	0.66
1957	405	348	0.86	0.69

*Millions of barrels. †Millions of dollars.

TABLE 6—REPLACEMENT COST PER NET BARREL INDUSTRY—ROCKY MOUNTAINS

	Cost per net barrel—Finding*	Developing	Operating	Replacement
1942	$0.01	$0.13	$0.29	$0.43
1943	0.03	0.16	0.33	0.52
1944	0.03	0.19	0.34	0.56
1945	0.59	0.18	0.36	1.13
1946	0.09	0.21	0.39	0.69
1947	0.47	0.21	0.44	1.12
1948	0.20	0.23	0.48	0.91
1949	0.21	0.26	0.50	0.97
1950	0.45	0.23	0.52	1.20
1951	0.13	0.33	0.56	1.02
1952	0.47	0.41	0.58	1.46
1953	0.82	0.56	0.59	1.97
1954	1.22	0.61	0.61	2.44
1955	1.31	0.45	0.64	2.40
1956	0.66	0.37	0.66	1.69
1957	0.69	0.35	0.69	1.73

*Includes water-flood factor.

TABLE 7—REPLACEMENT COST PER BARREL—PRIMARY AND SECONDARY

	Rocky Mountains		Kansas and Oklahoma		Ill. and Mich. basins	
	Repl. cost per bbl.	Avg. crude price	Repl. cost per bbl.	Avg. crude price	Repl. cost per bbl.	Avg. crude price
1942	$0.43	$0.93	$1.21	$1.19	$0.73	$1.36
1943	0.52	1.03	1.13	1.19	0.82	1.38
1944	0.56	1.06	1.12	1.23	0.86	1.40
1945	1.13	1.07	1.59	1.26	1.75	1.42
1946	0.69	1.22	1.22	1.43	1.63	1.60
1947	1.12	1.76	1.46	1.96	1.81	2.15
1948	0.91	2.41	2.77	2.58	1.62	2.77
1949	0.97	2.39	1.98	2.57	1.97	2.77
1950	1.20	2.28	2.34	2.57	2.22	2.77
1951	1.02	2.28	2.49	2.57	2.70	2.77
1952	1.46	2.28	2.17	2.57	2.55	2.77
1953	1.97	2.43	2.34	2.68	2.95	2.90
1954	2.44	2.51	2.41	2.77	2.53	2.97
1955	2.40	2.53	2.49	2.78	2.64	2.91
1956	1.69	2.59	2.72	2.77	3.16	2.92
1957	1.73	2.83	2.86	3.02	3.76	3.14

TABLE 8—CASH POSITION, INDUSTRY—ROCKY MOUNTAINS

	Annual net prod.	Avg. value per bbl.	Total value†—Crude oil	Gas	Oil and gas	Cash expense†	Cash position† (value-exp.)
1942	37	$0.93	35	2	37	23	14
1943	38	1.03	39	3	42	29	13
1944	38	1.06	40	3	43	42	1
1945	42	1.07	45	3	48	49	(1)
1946	51	1.22	62	3	65	74	(9)
1947	59	1.76	104	4	108	96	12
1948	70	2.41	169	5	174	131	43
1949	69	2.39	166	5	171	146	25
1950	81	2.28	186	5	191	180	11
1951	93	2.28	211	7	218	272	(54)
1952	95	2.28	218	9	227	373	(146)
1953	122	2.43	296	9	305	487	(182)
1954	142	2.51	358	13	371	600	(229)
1955	165	2.53	419	16	435	615	(180)
1956	189	2.59	484	18	502	684	(182)
1957	197	2.83	558	22	580	666	(86)

*Millions of barrels. †Millions of dollars.

cost per barrel (the sum of finding, developing and operating costs per barrel) and the average crude price in the area. These comparisons are made on Fig. 8. It is immediately apparent from Fig. 8 that the Rocky Mountain area currently and in the past has had the most favorable relationship between replacement cost and crude price per barrel. However, the need for an increase in finding efficiency—to lower replacement costs—is apparent in all areas.

The fact that there is a relationship between replacement cost and crude price indicates that either replacement cost is restricted by crude price or that crude price is pressured upward by replacement cost. Probably, neither is completely correct. Crude prices are affected by other factors also:

1. The price of competing crudes at refining centers.

2. The prices of petroleum products made from the crude oil.

3. The price or costs associated with competing energy sources.

The cost of any commodity must eventually be reflected in its selling price. However, other factors sometimes restrict prices. In such instances, the industry has only one alternative—lower its costs. The petroleum geologist can contribute to this lowering of costs by increasing his efficiency and finding greater quantities of oil. This is particularly important now, because the cost of finding oil per barrel is rising more rapidly than development and operating costs per barrel. Furthermore, it will continue to do so in the future.

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sums of money are spent finding and developing new reserves before any money is returned. The rapid expansion in the Williston basin, coupled with Denver and Paradox basins' activity, sharply accentuated the difference between income and outgo. A comparison of the money spent versus the money taken in is shown on Fig. 9.

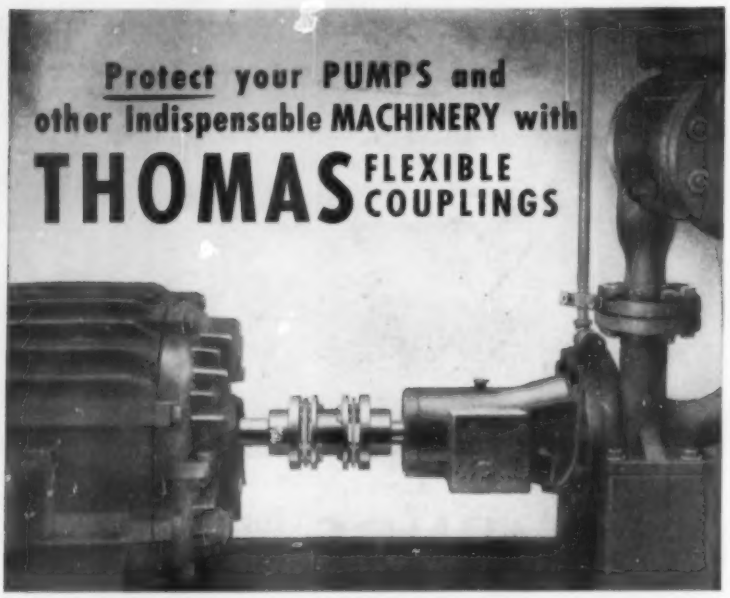
Since 1950, the oil industry in this area has accumulated a net deficit of $1,000,000,000. This deficit emphasizes the huge cash requirements of the petroleum industry. Sufficient reserves have been added to the Rocky Mountains (5,100,000,000 bbl.) to more than offset this deficit from future profits, but it will be some time before the deficit is erased.

The producing phase of the petroleum industry is handicapped as few industries are by lack of current data as to the success or failure of its exploration (investment) efforts. Some of the most worthwhile additions to petroleum statistics have been the publications of the Joint Survey; however, these are hardly more than a very small beginning. Many more data need to be published and preferably on an area basis. If the U. S. petroleum industry is to survive the intense competition with other crude suppliers of the world, it must become more familiar with its costs; it must find where the best opportunities lie for reasonable profits.

The petroleum geologist shares with other people in the industry the responsibility of giving products to the consumer at the lowest price. His share in this tremendous effort is to spend his exploration funds wisely.

Bibliography

1. "Petroleum Industry Income and Expenditures in the U. S.," a report by the Joint Association Survey (API, IPAA, and Mid-Continent Oil & Gas Association). April 1956.
2. Megill, R. E., "Selected Statistical Uses of AAPG Memberships List," Bull. AAPG, Vol. 39, No. 9, 1955.
3. "Expenditures for Drilling and Equipping Wells in 1953," a report by the Joint Association Survey. December 1955.
4. "The Oil-Producing Industry in Your State," published biannually, IPAA.
5. National Scouts and Landmens Association Yearbook.
6. Statistical Abstract of U. S. (Public Lands).
7. Megill, R. E., "How Much Does It Cost to Find Oil," The Oil and Gas Journal, Vol. 56, No. 19, 1958.
8. Megill, R. E., "Crude Oil Replacement Costs in the Illinois-Michigan Basin Areas," API Proceedings, Sect. 4, Prod. Bull. 244, 1958.



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North Texas field gets new pay

Whitesboro field in northwestern Grayson County, North Texas, has a new-pay zone in the Oil Creek sand at Standard Oil Co. of Texas 2 Mary McAdams. Initial tests of the sand produced 106 bbl. of oil in 2 hours through small choke.

No. 2 McAdams logged top of the Oil Creek at 12,813 ft. Tests were made on perforations at 12,813-55 and 12,844-65 ft. after a 1,000-gal. acid treatment. The 106-bbl. gage was under maximum surface pressure of 5,200 psi. Gravity of the oil was 50.1°. A later gage, through 12/64-in. choke, flowed oil at the rate of 609 bbl. per day, plus 2 M.M.c.f. gas. Maximum surface flowing pressure was 4,300 psi.

Location of the well is 2 miles west of Pottsboro townsite, in the W. B. Chiles Survey, A-317. Total depth was 12,977 ft.

First offset to Ohio pool completed

In Ohio, W. H. Patton et al. reported the 1 Brethren Church, Section 27, Knox Township, Holmes County, gaged 1,850 M.c.f. after fracture with a rock pressure of 1,250 psi.

This first offset to new pool discovery found the Clinton sand at 3,139-58 ft. and had 220 M.c.f. natural.

In West Virginia . . .

Five wells head for bottom

WEST VIRGINIA'S deep exploration is on the march. One of the leaders in this trek into the deeper rocks of the vast Appalachian basin is Hope Natural Gas Co. of Clarksburg. As a result of basement tests in the Sand Hill area of Ritchie and Wood counties, wildcatting with the accent on deepness has intensified in recent weeks.

There are five basement tests now drilling and two staked waiting on rotaries. There are two Oriskany tests staked in the Glady area, one of which would lengthen the field about 1½ miles, should it be successful. There is an Oriskany test drilling in the recent Oriskany development in Jackson County and two have been staked.

Following is a rundown of the wells now drilling and planned. They are spotted on the accompanying map.

Basement tests . . . Kanawha 1684: United Fuel Gas Co. on the UFGC Mineral Tract of 2,675 acres, well 8804-T. Delta Drilling Co. of Tyler is now setting up a Model 50-A rotary. Location is 6,500 ft. West Longitude 81° 25′, 11,500 ft. South Latitude 38° 25′, Clendenin Quadrangle, Elk District, Kanawha County.

Pocahontas 13: Benedum Trees Oil Co., on the Lawrence Shiflett tract. Well is drilling at 1,800 ft. with rotary tools. Location is on the Blackwater anticline in Glady field, 7,200 ft. East Longitude 79° 50′, 15,600 ft. South Latitude 38° 35′, 42,200 ft. southwest of Columbian Carbon Co.'s well GW-1220, completed for 7,040 M.c.f.d. This is the southernmost producer at Glady. The new well is on the Durbin Quadrangle, Greenbank district, Pocahontas County.

Randolph: Hope Natural Gas Co. 10182, West Virginia Board of Control, recently completed at total depth 6,173 ft. The well was dry and capped over for future abandonment. This well was finished at this depth due to lost circulation. The company is attempting to get off the fault now. Hope has staked West Virginia Board of Control 10228, 8,200 ft. east of Longitude 80° 00′, 14,800 ft. South Latitude 38°, 45′, Durbin Quadrangle, Huttonsville district, Randolph County, about 6,000 ft. northwest of the recent test at 10182.

Wetzel 410: Truman Smith 1 on the Charles R. and Goldia Stoneking farm. An Oriskany test drilling at 7,683 ft. This well is 4,400 ft. East Longitude 80° 30′, 15, 300 ft. South Latitude 39° 40′, Mannington Quadrangle, Church district, Wetzel County.

Pendleton 3: Blaho Oil & Gas Co. 1 James Sites. This well is shut down at present preparing to move in rotary rig. The well is located 500 ft. West Longitude 79° 30′, 1,000 ft. South Latitude 38° 50′, Horton Quadrangle, Union district, Pendleton County.

Staked tests . . . Following is a list of proposed tests in West Virginia:

Mason 69: United Fuel Gas Co. has staked the Grover Arrington on a 450-acre tract. Well 8803-T will go to basement. Location is 2,100 ft. East Longitude 82° 10′, 13,100 ft. South Latitude 38° 45′, Glenwood Quadrangle, Clendenin district, Mason County.

Ritchie 2005: Hope has staked location for 10211 A. M. O'Brien, Unit Lease of 662.50 acres, and will drill to bottom. Delta Drilling Co. will do the drilling, upon completion of United Fuel Gas Co.'s 8804-T in Kanawha County. The well is located on the Burning Springs anticline, 4,700 ft. East Longitude 81° 15′, 3,700 ft. South Latitude 39° 15′, Elizabeth Quadrangle, Grant district, Ritchie County. The well is 1 mile southwest of 10160 Elliott, 6,400 ft. southeast of previous basement test at Hope 9634 Power Oil Co. Total depth was 13,311 ft. It is also 2,000 ft. due east of Hope's 9300 Powell test.

Oriskany tests . . . Two Oriskany tests are slated for Pocahontas County:

Pocahontas 14: Columbian Carbon Co. has staked and is drilling at 680 ft. with spudder. The well is GW-1296 on U.S.A. Tract 54, consisting of 1,414 acres. This well is to be top-holed with spudder and to be completed with rotary upon completion of the GW-1297 well. It is on the Blackwater anticline in Glady field, 8,700 ft. West Longitude 79° 45′, 13,100 ft. South Latitude 38° 40′, Durbin Quadrangle, Greenbank district, Pocahontas County, and 8,500 ft. south southwest of Columbian Carbon's GW-1220 which made 7,040 M.c.f.d., as mentioned above.

Pocahontas 15: Columbian Carbon GW 1297 on U.S.A. Tract 52 consisting of 1,828 acres. This well is drilling at 1,250 ft. Sam Jack Drilling Co. of Avonmore, Pa., is contractor. Location is on the Blackwater anticline in Glady field, 5,500 ft. West Longitude 79° 45′, 7,000 ft. North Latitude 38° 40′, Durbin Quadrangle,

Greenbank district, Pocahontas County, and 4,100 ft. north northwest of Columbian Carbon's GW-1291 which made 17,250 M.c.f.d.

Clinton test . . . One Clinton sand well is drilling. It is the Fayette 106 of United Producing Co., Inc., 2704 of Charleston. The 1 New River and Pocahontas Consolidated Coal Co. lease consists of 24,590 acres. Well is drilling at 2,755 ft. in Big Lime. Proposed depth is 9,300 ft. Location is 8,600 ft. East Longitude 81° 00′, 7,900 ft. North Latitude 37° 55′, Meadow Creek Quadrangle, Sewell Mountain district, Fayette County.

Doig River: New B.C. oil discovery

NEW OIL PRODUCTION was added to British Columbia's growing list of producers last week. Sinclair Canada Oil Co. reported completion of its Doig River wildcat in 29-94-A-16-E, 45 miles north of Fort St. John town and 20 miles south of nearest Triassic oil wells at Milligan Creek.

The Doig River discovery flowed at the daily rate of 515 bbl. of 39.5°-gravity oil on ⅝-in. choke from Triassic "D" zone perforations at 3,840-65 ft. This new field opener is on a 44,647-acre block which is part of a 157,960-acre reservation in which Sinclair Canada owns half working interest.

The pay zone is 25 ft. thick. Two other wildcats are drilling nearby. The team of Phillips Petroleum Co., Canada Southern Petroleums, Ltd., West Canadian Oil & Gas, Ltd., and Scurry Rainbow Oils, Ltd., is busy at two wildcats—the C72-J Milligan is near the Triassic section after finding gas shows in the Bluesky; the other is near completion depth with no success reported as yet.

The entire northeast oil corner of B.C. is busy this month. At Beatton River, Triad Oil Co. has found oil in the Bluesky at two wildcats about 5 miles west of Triassic production. The 39K Beatton River and the 48K Beatton River are both testing in the Bluesky. The wells have been making about 100 and 150 bbl. of clean oil per day, respectively, on production tests. No potentials have been run. This winter Triad alone has drilled nine wells at Beatton River, only two of which were considered development wells. Of those, two are Bluesky wells, two are Triassic "D" producers, and one found oil in the basal Gething. Four wells were dry.

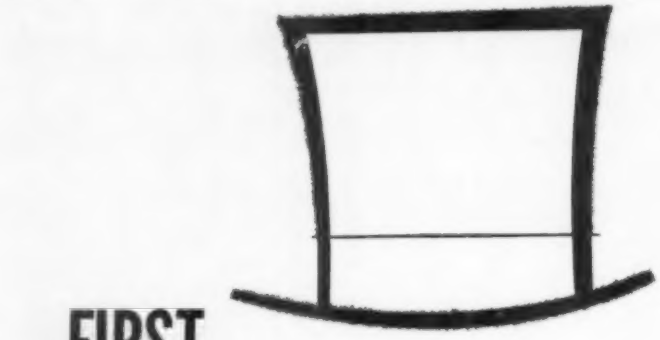
Milligan Creek's activity this season consists of Union Oil Co. of California's development work. No details have been released. Boundary Lake, the other field in the region, is inactive.

California's third offshore well dry

AFTER two good producers, Standard Oil Co. of California turned up a dry hole on its 5,500-acre offshore lease at Summerland. The well was officially labeled as suspended at 8,646 ft. with the added notation that it will probably be slant-drilled again to test another part of the lease. A Standard engineer recently revealed a second rig would soon be installed on the platform. Both rigs will use the same derrick simultaneously. In all, the platform is designed to accommodate 25 wells.

Alberta oil moves to far north

ALBERTA'S northernmost oil production follows by only 2 weeks its northernmost gas production. Sinclair Canada Oil Co. completed the 16-8 Peerless Lake, 13 miles northeast of Red Earth Creek field in northern Alberta swabbing 128 bbl. of oil daily



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from basal Elk Point Devonian through perforations at 4,747-85 ft. The well is on LSD 16, 8-9-6w5, on Sinclair Canada's wholly-owned 100,000-acre reservation.

Just 2 weeks ago Honolulu Oil Corp. and Texaco Exploration Co.'s Bison Lake wildcat, 60 miles northwest of Red Earth Creek field, flowed 12,100 M.c.f.d. of gas from Gilwood sand at 4,738-48 ft., establishing the province's northernmost production.

Arkansas discovery extends Kress City

A newly completed well in the Kress City area of Lafayette County, southwestern Arkansas, extends the productive limits of the field's Buckner-Ford zone nearly a half mile northwest.

Kin-Ark Oil Co.'s 1 Herndon, the new deep producer, flowed 120 bbl. of 39°-gravity oil daily through ⅛-in. choke. Flowing pressure was 470 psi. Its pay, in the 8,333-ft. hole, is perforated at 8,305-10 ft.

Location is on a solid lease block of 1,280 acres. Kin-Ark plans a raid development program.

New pay hinted in Saskatchewan

A NEW OIL STRIKE in the southeastern sector of Saskatchewan might spark a new program for the team of Tidewater Oil Co., Central Del Rio Oils, Ltd. British American Oil Co., Ltd., and Union Oil Co. of California.

The discovery hole lies in the Parkman region of the province about 20 miles west of the Manitoba border and 65 miles northeast of Estevan. Drill-stem tests in the Souris Valley beds or Lodgepole horizon gave up encouraging pipe recoveries of oil from the zone but it wasn't until logs had been run and the well pump-tested that commercial prospects were known. Actually the Souris Valley was, until now, unknown as far as oil production is concerned in this sector of Saskatchewan, although it has proved productive in many oil producers in Manitoba.

According to the report, the Tilston beds which overlay the Souris Valley as a rule, were not present in this new hole as that Souris Valley structure had stayed high and eroded the other out.

The well, Tidewater et al. 2-28 Parkman Crown, LSD 2, 28-9-33w1, is 6 miles east of oil production in Manor field and 12 miles north of the McCarthy & Coleman 6-26 Knight Mission Canyon oil discovery well.

This discovery hole was taken down

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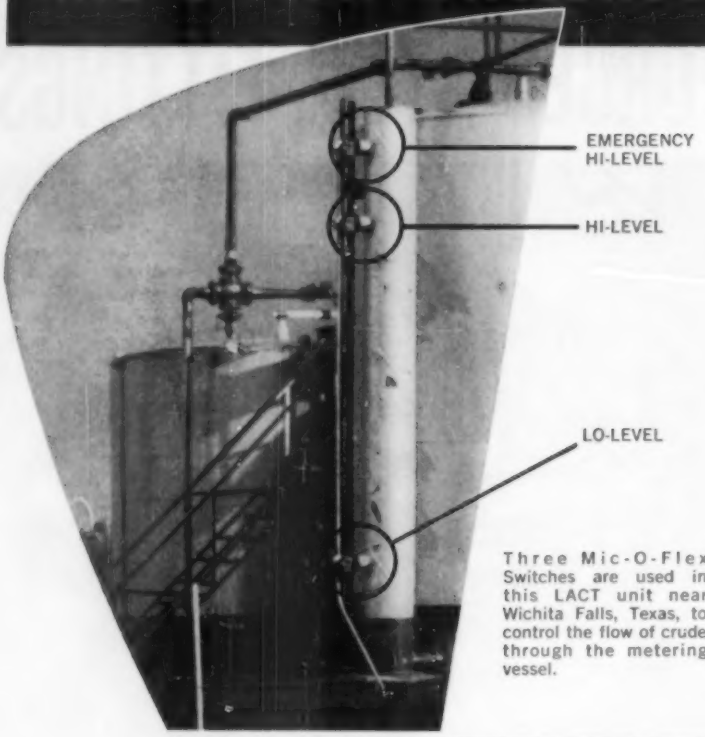
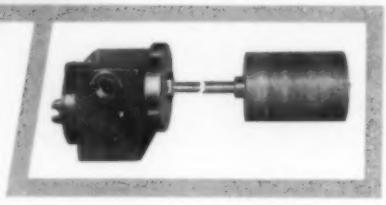
Mic-O-Flex Switches



Three Mic-O-Flex Switches are used in this LACT unit near Wichita Falls, Texas, to control the flow of crude through the metering vessel.

INSTALLED IN LIQUID LEVEL CONTROL BOOT



Mic-O-Flex Switches are electric, positive action float-type liquid level controllers, using Flextubes® to actuate a micro-switch. Mic-O-Flex Switches may be used as high or low level limit switches to sound alarms, flash signal lights, start or stop pumps or operate control valves. They are unaffected by extreme pressures or temperatures, and are ideal for use on low dielectric liquid hydrocarbons.

SPECIFICATIONS:

SWITCH: S.P.D.T. Micro-switch, 15 amp., 125, 250 or 460 V.A.C.
HOUSING: Explosion-proof
PRESS. RATING: Up to 1000 psi
MOUNTING CONNECTOR: 4" flange or grooved coupling adaptor
ADJUSTMENTS: Fine and coarse sensitivity, set-point 3½" span
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PIONEERS IN LEVEL MEASUREMENT AND CONTROL INSTRUMENTATION

on a pooled tract by the four companies mentioned above. The pooling agreement was set up whereby each company contributed certain acreage (960 acres in total) and financing in order to develop their holdings in the vicinity of the well. Tidewater acted as operator of the agreement and is contemplating starting another well in the vicinity in the near future.

The Souris Valley pay was found at the 3,430-ft. level. A drill-stem test covering 18 ft., gave up 60 ft. of slightly oil-cut mud, 60 ft. of gassy oily mud, 180 ft. of mud-cut oil and 180 ft. of gassy oil. After carrying the well to total depth of 3,550 ft., a string of production casing was set in the hole through the 10 ft. of net pay encountered. That section was then perforated and pump tests to date have rated an average of between 110 and 120 bbl. of clean, light-gravity oil per day.

Central Del Rio appears to be the largest single acreage holder in the vicinity of the test, as in addition to the acreage that it contributed to the pooling agreement, also holds another quarter section diagonally offsetting the discovery. Ownership of that latter tract is held entirely by Central.

AN OIL-BARREN PORTION of Montana's Disturbed belt will see wildcat action this spring.

Quiet Disturbed belt will stir

THE all-too-quiet mountain front of northwestern Montana is in for some action. Anaconda Co. has announced locations for five wildcats in Lewis & Clark and Cascade counties. This is the first exploration for this company in some time. The new tests are also the first wildcats in this portion of Montana in a long time.

Work will begin in a few weeks after contracts are let. Three of the townships where some of the drilling will be have had no previous activity —18n-2w, 18n-3w, and 20n-4w. There was a shallow test drilled some time

ago in 20n-6w where a 6,250-ft. Madison wildcat is slated by Anaconda. There are three dry holes in 20n-3w where a 4,950-ft. Devonian test is planned.

Montana's mountain front, or better-known Disturbed belt, has had scattered sprees of wildcatting in recent years. Many tests had good shows but met with failure. Early in 1958 first production came to the Disturbed belt at Blackleaf. This gas discovery brightened hopes for a possible southeast extension of the prolific production being developed across the border in Southwest Alberta. Anaconda's new attempts will be watched closely.

New offshore field gets second well

The second producer in CATC Group's recently opened Eugene Island Block 208 field, nearly 50 miles offshore from St. Mary Parish, Louisiana, is rated good for more than 350 bbl. of 34.4°-gravity oil daily, flowing through ⅛-in. choke under pressure of 3,100 psi. Flow is with 254 M.c.f.d. of gas.

The well, 2-A OCS-0576, opens a pay zone 1,150 ft. deeper than the 8,880-ft. sand of the group's discovery well. Pay is perforated at 10,029-34 ft. Both wells were drilled from the same platform. Bottom of the new producer is 1,150 ft. north and 925 ft. east.

Kentucky deep test continues to bottom

In Martin County about 1 mile southeast of Inez on Coldwater Fork, United Fuel Gas Co. 1 J. W. James is drilling at 8,550 ft. presumably in Knox dolomite of Cambro-Ordovician age. Test is designed to test all formations above the basement complex.

Louisiana's Gordon opens deep oil play

New deep oil production is being opened off the south flank of the old Gordon shallow gas area, northeast of DeQuincy in southern Beauregard Parish, southwestern Louisiana.

Commonwealth Oil Co.'s discovery well, 1 Edgewood, flowed 160 bbl. of 45°-gravity oil per day from Cockfield sand at 8,919-39 ft. Flow was gaged through ⅛-in. choke with pressure of 400 psi. Hole was drilled to 9,520 ft. and logged other potentially productive zones.

Location is in 35-6s-10w on a 1,500-acre lease block.

Michigan record

Carter Oil Co. set a Michigan record for continuous core at 1 Farley-Rosenau, NW SW NW 23-3s-4w, Calhoun County, coring from 3,905 to 4,486 ft. through Trenton and Black River sections. North offset to Albion discovery, Carter bottomed out at 4,518 ft., drilling last 32 ft. with conventional bit. Cores were given preliminary field logging and then canned and boxed for later lab analysis.

Analysis of cores is expected to offer major help in determining best development and production techniques for the new area.

Carter cored over 100 ft. of Trenton carrying vugular porosity and oil and gas bleeding. Well was cased with 5½ in. to bottom for later completion by perforating.

• First follow-up development in the Pulaski play, between Albion and Scipio, has been disappointing. Both Carter and Union drilled Trenton dry holes less than one-half mile due south of the discovery, and Sun Oil Co. 1 Blair, northeast diagonal offset to the discovery, recovered only 14 bbl. net oil in 48 hours swabbing, after perforating Trenton pay and acidizing. The discovery has been flowing 150 to 180 bbl. oil per day natural since completion in January this year.

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The February well story in U. S. A.

	TOTAL COMPLETIONS							WILDCAT WELLS							
	Total	Crude	Cond.	Gas	Dry	Service	Footage	Total	Crude	Cond.	Gas	Dry	Footage	C.T.	Act. op.
Alabama	4	2	0	0	2	0	36,880	1	0	0	0	1	2,051	0	10
Alaska	1	0	0	0	1	0	14,375	1	0	0	0	1	14,375	0	4
Arizona	1	0	0	0	1	0	1,151	1	0	0	0	1	1,151	1	11
Arkansas	73	46	0	3	22	2	238,294	6	1	0	0	5	25,776	0	90
California	119	86	0	6	27	0	619,555	27	6	0	1	20	173,971	2	112
Colorado	55	12	0	8	35	0	287,038	29	2	0	4	23	146,644	0	58
Illinois	172	72	0	0	81	19	374,742	26	1	0	0	25	45,558	21	315
Indiana	54	21	0	3	30	0	79,418	18	2	0	0	16	26,140	43	56
Kansas	269	122	0	11	128	8	941,243	54	6	0	1	47	203,875	31	387
Kentucky	138	73	0	11	52	2	142,190	22	11	0	0	11	17,298	120	301
Louisiana	256	122	22	13	99	0	2,056,848	33	7	0	3	23	301,364	0	325
North	92	46	0	11	35	0	369,290	19	7	0	3	9	136,614	0	114
South	140	63	21	2	54	0	1,452,797	14	0	0	0	14	164,750	0	163
Offshore	24	13	1	0	10	0	234,761	0	0	0	0	0	0	0	48
Michigan	34	15	0	5	14	0	92,783	7	0	0	0	7	19,660	15	138
Mississippi	31	8	4	0	19	0	295,048	16	3	0	0	13	147,124	0	62
Montana	24	9	0	0	15	0	105,961	13	1	0	0	12	61,544	4	55
Nebraska	48	18	0	0	30	0	287,207	22	0	0	0	22	126,372	0	48
New Mexico	138	86	4	22	26	0	517,846	7	2	1	0	4	37,356	36	161
New York	22	12	0	0	3	7	34,424	3	0	0	0	3	9,852	22	15
North Dakota	36	18	0	0	18	0	246,217	12	3	0	0	9	81,807	0	51
Ohio	79	36	0	25	11	7	201,269	2	1	0	0	1	7,440	75	198
Oklahoma	471	246	7	23	173	22	1,541,587	63	9	1	6	47	280,501	88	724
Pennsylvania	55	14	0	29	5	7	186,044	2	0	0	1	1	13,875	50	14
Tennessee	1	0	0	0	1	0	900	1	0	0	0	1	900	1	3
Texas	1,265	706	44	65	425	25	5,690,573	240	28	5	9	198	1,213,018	110	1,152
Dist. 1	65	26	3	1	35	0	184,453	22	1	0	0	21	57,865	0	28
Dist. 2	49	14	6	7	22	0	304,577	16	2	2	3	9	97,935	0	42
Dist. 3	80	32	6	1	41	0	574,684	22	0	1	0	21	174,193	0	64
Dist. 4	83	22	13	10	38	0	479,468	19	4	1	0	14	116,760	6	61
East	81	42	6	1	32	0	374,741	17	1	0	0	16	99,080	0	48
Dist. 7-B	150	67	3	8	71	3	480,991	48	8	0	3	37	153,939	15	99
West	406	319	8	4	70	9	2,163,868	41	3	1	1	36	270,829	43	566
Dist. 9	246	126	6	12	95	13	660,902	40	6	0	2	32	143,653	46	113
Dist. 10	105	58	5	21	21	0	466,889	15	3	0	0	12	98,764	0	131
Utah	31	19	0	1	11	0	184,841	9	0	0	1	8	58,721	0	50
West Virginia	52	7	0	37	7	1	131,869	2	0	0	1	1	11,810	51	201
Wyoming	61	22	0	3	36	0	331,326	25	1	0	0	24	158,774	3	112
Feb. 1959	3,490	1,772	81	265	1,272	100	14,639,629	642	84	7	27	524	3,186,957	673	4,653
Jan. 1959	4,654	2,303	124	314	1,801	112	19,724,765	963	88	13	31	831	4,853,571	742	4,930
Cum. 1959	8,144	4,075	205	579	3,073	212	34,364,394	1,605	172	20	58	1,355	8,040,528	1,415	...
Cum. 1958	8,439	4,229	194	631	3,214	171	35,740,014	1,732	157	22	70	1,483	8,108,871	...	...

D.D. = 28: Mont. 1, Ill. 2, Texas (1) 1, Texas (4) 1, Wyo. 1, N.D. 1, Okla. 21.

. . . and Western Canada

	TOTAL WELLS							WILDCATS					
	Total	Oil	Gas	Dry	Service	Footage	Cum. 1959	Total	Oil	Gas	Dry	Footage	Cum. 1959
Alberta	119	64	14	40	1	701,886	230	42	8	3	31	251,567	73
Saskatchewan	67	35	1	31	..	300,180	122	30	..	1	29	133,297	47
Manitoba	3	1	0	2	..	7,574	6	2	0	0	2	5,425	3
British Columbia	15	2	4	9	..	77,388	23	14	2	4	8	73,646	21
N. W. T.	1	..	..	1	..	3,896	1	1	..	..	1	3,896	1
Total February	205	102	19	83	1	1,090,924	382	89	10	8	71	467,831	145

Palo Duro strike takes flow test

HARDEMAN COUNTY'S Mississippian discovery, considered by some geologists to be within the Palo Duro basin, reported a number of flow tests last week. The pay is Chappell limestone, in open-hole at 7,800-8,008 ft.

A 22-hour gage through 40/64-in. choke, tanked 195 bbl. of oil, under tubing pressure of 50 psi. Operators re-treated with 20,000 gal. of acid, then gaged 226 bbl. of oil and 8 bbl. of water in 24 hours through 32/64-in. choke. Testing continued.

Location is 8 miles west of Chillicothe, in Section 81, Block H, W&NW Survey.

California outpost

An outpost about ¼-mile north of production in the eastern part of the Rosedale field in Kern County was completed in an interval at 4,786-4,845 ft. by Humble Oil & Refining Co.

Discovery wells

CALIFORNIA

Kern County: Signal Oil & Gas Co. 41-13 KCL, NE NW 13-30s-26e, 218 BOPD, 11/64-in. choke, perfs. 6,965-7,020 ft. and 7,046-56 ft., TD 9,707 ft. (Shallow pool discovery in Gosford field.)

COLORADO

Logan County: British-American Oil Producing Co. and Wytex Oil Co. 1 Koester "C," C NW NW 30-10n-53w. IPP 153 BOPD, 25 BWPD, "D" sand discovery, new field. TD 5,077 ft. "J" sand.

Morgan County: Excelsior Oil Co. 1 Barber, C SE SE 24-4n-60w. IPF 35 BOPD,

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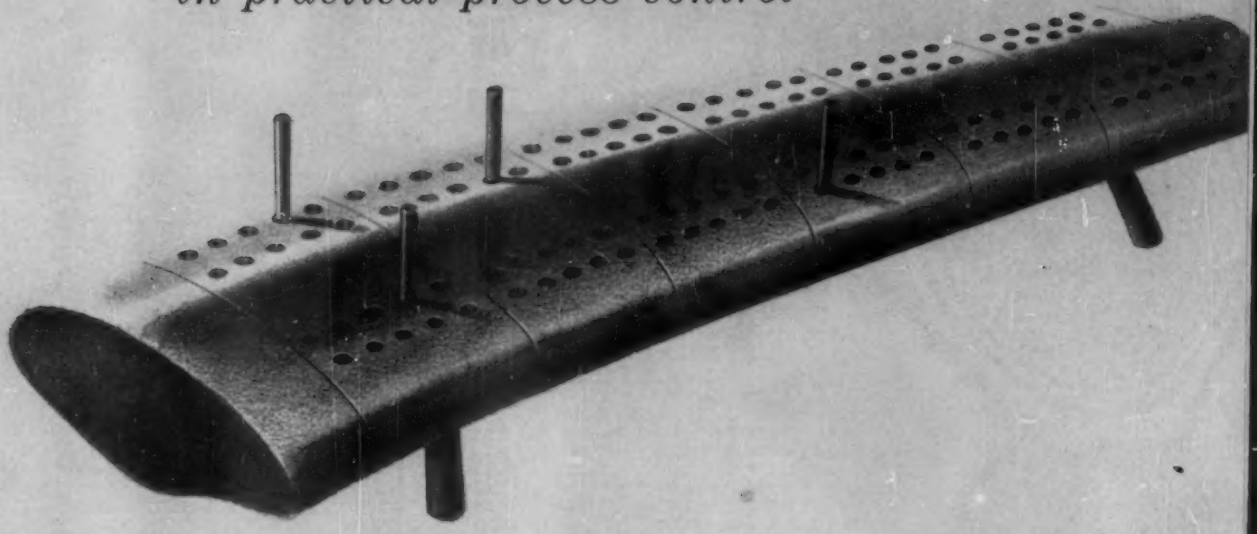

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February footage breakdown

	FIELD WELLS					WILDCAT WELLS			
	Oil	Cond.	Gas	Dry	Service	Oil	Cond.	Gas	Dry
Alabama	23,131			11,698					2,051
Alaska									14,375
Arizona									1,151
Arkansas	132,356		17,527	59,235	3,400	2,920			22,856
California	378,732		24,244	42,608		51,279		7,360	115,332
Colorado	51,352		20,445	68,597		6,170		27,816	112,658
Illinois	166,688			122,469	40,027	2,342			43,216
Indiana	29,782		2,649	20,847		3,710			22,430
Kansas	396,674		28,662	278,369	33,663	25,749		4,485	173,641
Kentucky	43,245		27,559	51,478	2,610	9,419			7,879
Louisiana	842,981	274,430	45,075	592,998		56,818		24,261	220,285
North	104,628		15,680	112,368		56,818		24,261	55,535
South	610,253	261,820	29,395	386,579					164,750
Offshore	128,100	12,610		94,051					
Michigan	40,130		13,418	19,575					19,660
Mississippi	54,721	32,780		60,423		27,028			120,096
Montana	34,572			9,845		1,251			60,293
Nebraska	113,096			47,739					26,372
New Mexico	319,770	22,068	79,115	59,537		11,287	6,596		19,473
New York	15,252				9,320				9,852
North Dakota	118,926			45,484		18,424			63,383
Ohio	107,803		45,755	20,343	19,928	3,525			3,915
Oklahoma	749,311	49,319	93,163	313,502	55,791	69,311	8,150	39,356	163,684
Pennsylvania	27,024		112,472	19,419	13,254			6,775	7,100
Tennessee									900
Texas	2,912,542	341,389	241,998	924,808	56,818	158,779	41,511	35,214	977,514
Dist. 1	50,692	30,189	6,070	39,637		2,005			55,860
Dist. 2	63,169	36,400	21,571	85,502		12,335	18,882	11,145	55,573
Dist. 3	209,419	54,479	8,325	128,268			11,502		162,691
Dist. 4	100,828	104,117	39,128	118,635		29,606	6,012		81,142
East	153,890	42,283	2,300	77,188		7,215			91,865
Dist. 7-B	199,961	2,881	21,966	97,218	5,026	32,586		12,286	109,067
West	1,629,598	32,993	28,479	174,204	27,765	24,486	5,115	2,320	238,908
Dist. 9	279,590		57,728	155,904	24,027	27,941		9,463	106,249
Dist. 10	225,395	38,047	56,431	48,252		22,605			76,159
Utah	108,825			17,295				5,289	53,432
West Virginia	14,679		87,268	15,942	2,170			4,758	7,052
Wyoming	85,715		17,371	69,466		5,420			153,354
Total U. S.	6,767,307	719,986	856,721	2,871,677	236,989	453,432	56,257	155,314	2,521,954
Western Canada	507,599		54,063	56,557	4,874	71,168		54,870	341,793
Alberta	346,787		54,063	44,595	4,874	63,486		28,335	159,746
Saskatchewan	158,663			8,220				3,533	129,764
Manitoba	2,149								5,425
British Columbia				3,742		7,682		23,002	42,962
N. W. T.									3,896

750 M.c.f.d., "J" sand discovery, new field. TD 6,334 ft. "J" sand.

Washington County: Plains Exploration Co. 1 Mitchell, SE NW 28-2n-54w. IPP 96 BOPD, "D" sand discovery, new field. TD 4,939 ft. "J" sand.

ILLINOIS

Clay County: R. Hendricks 1 Wells, SE NW SE 26-4n-8e. IPP 37 BOPD, Cypress 2,680-89 ft. TD 3,121 ft. Opens Pixley field.

NEBRASKA

Kimball County: Wyoming-Western Oil Co. 2-1 Benziger, C NW SE 2-14n-58w. IPP 62 BOPD, and 50% water, "J" sand discovery, new field. TD 6,876 ft. "J" sand.

NORTHWEST NEW MEICO

San Juan County: Alex N. Campbell 1 Federal-Tonkin, SE SE 23-27n-12w. IP 4,921 M.c.f.d., Dakota discovery, new field. TD 6,259 ft. Dakota.

OKLAHOMA

McClain County: Siboney Petroleum Corp. 1 Clover Leaf Ranch, C NE NW SE 12-6n-3w. IPP 41 BOPD, 44°, Hunton 8,258-88 ft. TD 9,950 ft. Oil discovery, new field.

Texas County: Republic Natural Gas Co. 12 Cities Service, C NW SW 5-4n-13eCM. IPF 192 BOPD, Cherokee sand Pennsylvanian 5,480-93 ft., 24/64-in. choke. TD 5,620 ft. Oil discovery inside Hugoton field in northwestern Anadarko basin.

SOUTHWEST TEXAS

Jim Wells County: Dillon & Bruns 1 LaRose, Block 7, Adams-Staples Farm Lots Subd., 6 miles southeast of Alice. AOF 7,700 M.c.f.d., dry gas, shut-in TP 1,140 psi., perf. 2,702-09 ft., Heterostegina. TD 3,600 ft. New pay in North Magnolia City field.

McMullen County: Standard Oil Co. of Texas 2 J. B. Henry, A. S. Kuykendall Sur., A-1256, 4 miles northwest of Tilden. IP 179 BOPD, 3% water, 14/64-in., 38°, TP 200 psi., perf. 3,572-76 ft., Carrizo. TD 3,720 ft. New pay in Henry (Carrizo) field.

Zapata County: Jonnell Gas Co. 1 Benavides, Tract 2, Share 13, Porcion 22, 16 miles southeast of Zapata. Shut-in gas well, no gage. TD 8,120 ft. New field.

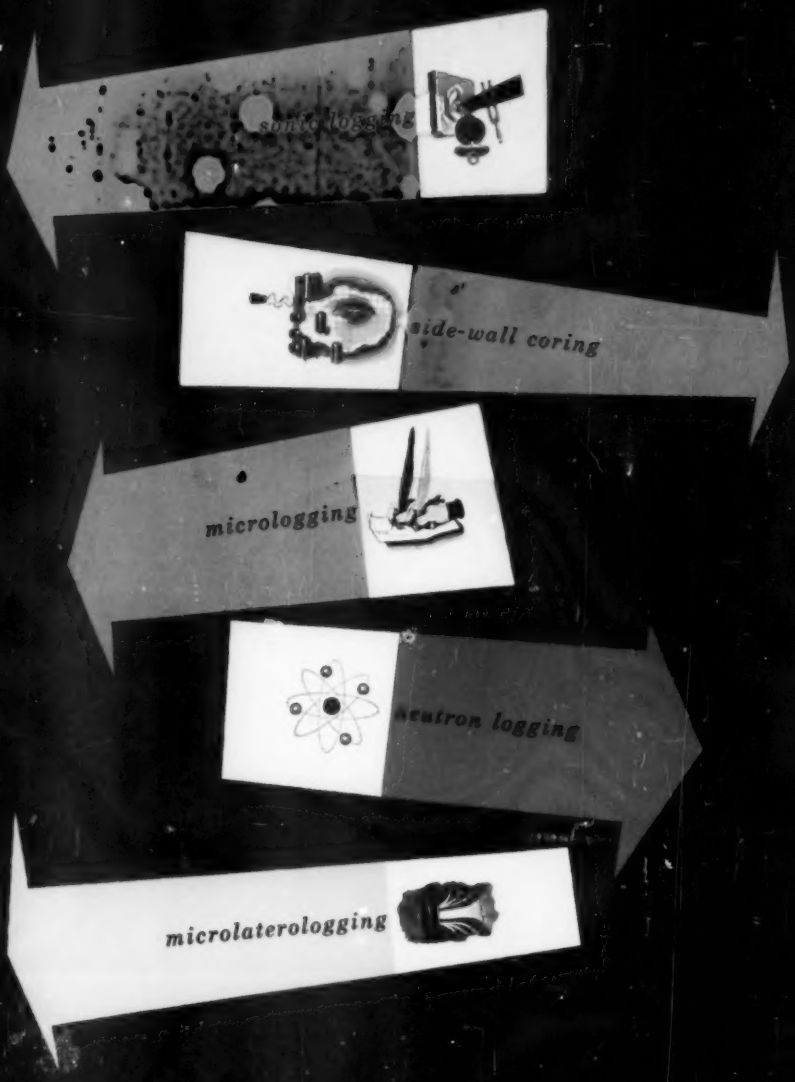
TEXAS GULF COAST

Jackson County: Texkan Oil Co. 1-A Nyegaard "A" Gas Unit, W. D. Sutherland Sur., A-76, 2½ miles east of Ganado. AOF 144 M.M.c.f.d., GLR 125 M.c.f. per bbl., 56°, shut-in TP 2,377 psi., perf. 6,144-51 ft., Frio. TD 6,661 ft. Second well and new pay in East Mustang Creek field.

Kleberg County: Humble Oil & Refining Co. 8 King Ranch Alazan, Las Comitas Grant, 11½ miles southwest of Chapman Ranch. IP 98.44 BOPD (net), 8% water, ¼-in., 41°, GOR 7,742 cu. ft. per barrel, TP 780 psi., perf. 8,290-93 ft., Frio. TD 9,008 ft. New pay in north Alazan field.

Live Oak County: Neville G. Penrose, Inc., 1 Gallagher, P. Salinas Sur., A-418, 4 miles northwest of Dinero. IPP 15 BOPD, 46°, GOR 20 cu. ft. per bbl., perf. 4,675-83 ft., Yegua. TD 4,903 ft. New reservoir in Fort Merrill area—discovery well of North Fort Merrill field.

Neville G. Penrose, Inc., 2 Gallagher, P. Salinas Sur., A-418, 933 ft. southwest of 1 Gallagher discovery well. IP 46.88 BOPD, 14/64-in., 46°, TP 375 psi., GOR 2 M.c.f. per bbl., perf. 4,476-84 ft., Yegua. TD 4,725 ft.



Five methods of porosity determination

by SCHLUMBERGER

If you are lacking porosity data, you are not getting full value from your logging program. Porosity is a necessary element of reservoir analysis. Establishing the presence of oil, the degree of saturation, and the producibility of the formation all hinge on knowledge of porosity.

But there is no single universal logging method for getting this basic information. The best way in any area may depend on reservoir characteristics, on borehole conditions, or on the additional data which each method contributes. Sometimes the inclusion of two porosity devices in the logging program gives information on lithology and fluid content that no single log can achieve. *That's Why Schlumberger Offers Five Methods of Porosity Determination.* Your Schlumberger engineer can tell you which to use in your drilling area. Of this you can be sure: **The Best Way is The Schlumberger Way.**

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—with wrench and screwdriver!
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Just two of many variations that can be made from a standard ALLISPEDE DRIVE.

The ALLISPEDE* DRIVE gives you complete field versatility!

It's the most flexible and precise mechanical adjustable speed drive made ... and the only one that can be fully adapted in the field!

The *all-new* ALLISPEDE DRIVE is the answer to any motor application that calls for low-cost adjustable speed. It permits smooth, easy speed adjustment — and maintains it exactly. Its modern design permits unusual field-flexibility — lets the user change the unit *any time* to suit his various requirements.

The a-c ALLISPEDE DRIVE is the *only* drive that can be fully adapted in the field by the user. The basic unit goes together like building-blocks ... feet, end brackets, control hand wheel, conduit box, and output shaft can be relocated in minutes to fit existing space limitations. The same unit can be changed from an upright to a horizontal drive for floor, wall or ceiling mounting. And all you need is a wrench and screwdriver!

Superior design improves drive efficiency and extends service life. The four bearings equally distribute belt load, increasing bearing and belt life. Movable discs slide smoothly on internally-lubricated splined shafts — won't stick in place or wear. Belt changes are faster — never disturb the dial or adjustment mechanism. Rugged cast-iron housing with plated steel covers shields drive against dirt and corrosion ... integral rotor fan cools the motor and force-ventilates the drive housing to extend bearing life. Oversize cartridge bearings are pressed on shaft and lubricated at the factory. Corrosion-resistant stainless steel nameplates diagram proper motor connection, specify bearing sizes, and carry complete instructions for operation and lubrication.

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ASD-118

LOUIS ALLIS

MANUFACTURER OF ELECTRIC MOTORS AND ADJUSTABLE SPEED DRIVES

Paul Benedum Is Really Busy

. . . as president of four firms, vice president or director of five more. Civic obligations keep him hopping, too.

OFFICERS of companies associated with Benedum-Trees meet daily for lunch in a private suite of Pittsburgh's exclusive Duquesne club. Places are set for 14 but it's seldom that all are filled. One of those most often vacant is the seat reserved for Paul G. Benedum.

There are two good reasons for this. First, Paul Benedum travels extensively in the interest of the companies with which he is associated. In the second place, when he is in Pittsburgh, he frequently is attending meetings of civic, educational, and welfare agencies in which he is actively interested.

Benedum is president of Bentex Oil Corp., Hiawatha Oil & Gas Co., Penn-Ohio Gas Co., and Melben Oil Co. Their principal operations are in Texas and the Rocky Mountains, and they have some producing operations in Kentucky, Illinois, and Ohio. They are doing considerable exploration work in the Rockies.

Benedum also is a vice president and director of Plymouth Oil Co. and Republic Pipe Line Co. and a director of Arkansas Fuel Oil Corp., Arkansas Pipe Line Co., and Peoples First National Bank & Trust Co. of Pittsburgh.

His "outside" interests are equally numerous. He is a director of the Boys' Club of Pittsburgh, Inc., on the executive board of the Boy Scouts, on the board of managers of the Children's Hospital, a director of the Pittsburgh Symphony Society and the Western Pennsylvania School for Blind Children and a trustee of Shady Side Academy and West Virginia Wesleyan college. He is a member of the Pittsburgh Chamber of Commerce and the Allegheny Conference on Community Development.

Paul G. Benedum
Pittsburgh's dynamic powerhouse . . .

He is active in industry associations as well. He is a member of the National Petroleum Council, the Military Petroleum Advisory Board, and the Defense Services Committee of the API.

As the son of Charles Y. Benedum and a nephew of the great wildcatter, M. L. (Mike) Benedum, Paul Benedum bears one of the most famous names in oil.

His birthplace was Cameron in Marshall County, West Virginia. After graduating from Cameron high school, he attended Ohio State University. He majored in metallurgical engineering and geology and received his degree in 1927.

He went to work for Benedum-Trees as a geologist the year he got out of school. In 1930 he headed a geological expedition to the Lake Van region of Turkey for M. L. Benedum. When he completed that assignment, he returned to Benedum-Trees and worked as a geologist in Pennsylvania, New York, Texas, Louisiana and Arkansas.

He got his first executive job in 1934 when he was made president of Melba Mining Corp. In 1936 he left Melba to return to Benedum-Trees as district manager for Texas, Louisiana, and Arkansas. He was in that post when World War II began.

He served from 1943 through 1945 as a lieutenant colonel in the Army Air Force as chief, facilities and production section of the Aviation Petroleum Branch. This won him the Legion of Merit, awarded by the War Department for "exceptionally meritorious conduct in the performance of outstanding service."

He and Mrs. Benedum, the former Beatrice Willeen Ludwig, reside on Woodland Road, Pittsburgh. They have one son, Paul Gregory Benedum, Jr.

Benedum will return to his native state April 16. He will address the Sisterville, W.Va., Board of Trade during the city's special observance of the 100th anniversary of the oil industry.

▶ ▶ ▶ Personals

T. R. (Red) Masters, process foreman with Creole Petroleum Corp. in Venezuela, has retired and moved to Augusta, Ga. Masters has been in the oil industry 30 years. He was with Plantation Pipe Line Co. and Lago Oil & Transport Co. before going to Venezuela with Creole.

Fred M. Odom, Jr., and **C. A. Sullins** have been elected directors of Union Producing Co. Odom has been a vice president of United Gas Corp., United Gas Pipe Line Co. and Union Producing Co. since 1957. Sullins has been general drilling and production superintendent for Union Producing in Shreveport, La., since last year.

Robert E. Loebeck, Phillips Petroleum Co., has been nominated for president of the Tulsa section of Instrument Society of America. Two nominees have been named for other offices. Election will be by mail ballot. Candidates for vice president are **George E. Woolfall,** Oklahoma Natural Gas Co. and **John Ryan,** Skelly Oil Co.; for program chairman, **Carl Osborn, Jr.,** Phillips Chemical Co., and **R. E. Wightman,** Phillips Petroleum Co.; for membership chairman, **Stuart Love,** Kerr-McGee Oil Industries, Inc., and **Percy Gardner,** Oklahoma Natural. Nominated for secretary are **Ray Herring,** D-X Sunray Oil Co., and **Charles Lumpkin,** Callery Chemical Co.; for treasurer, **John Elsloo,** Refinery Engineering Co., and **Bob McCraw,** Warren Petroleum Corp. **Max T. Nigh,** Service Pipe Line Co., is a candidate for director. Running for committeemen are **Clayton Perry,** The Texas Co.; **W. W. Vandiver,** D-X Sunray; **L. L. Benthall,** Midland Cooperative Refining Co.; and **Glen Mace,** Williams Brothers Co.

G. L. Browne, district geologist in Evansville, Ind., for Inland Producers, Inc., has been promoted to manager. He will be in charge of exploration. He succeeds **J. R. Atkinson,** who has been named head of the production department for C. L. McMahon, Inc., in Tulsa. **Ray R. Vincent,** engineer for Inland Producers, has been named head of production and valuation in the Evansville office.

▶▶▶ Personals

Willis A. Strauss, administrative vice president of Northern Natural Gas Co., has been elected executive vice president. Strauss will be responsible for operations of the company, working within the framework of policies established by the president, policy committee, and board of directors. Northern Natural's policy committee is made up of senior vice presidents **A. B. Dilworth, W. L. Shomaker, M. L. Mead,** and **P. A. Gass.**

STRAUSS

W. C. King has been named director of market research and economic analysis in Gulf Oil Corp.'s petrochemical department. King joined Gulf Research & Development Co. in 1948 and moved to Gulf Oil's petrochemical department in 1955.

Victor B. Gras, geologist in Rock Springs, Wyo., for Mountain Fuel Supply Co., has been named area development geologist for the company. **Lyle A. Hale,** geologist, has been transferred from Price, Utah, to Rock Springs as district geologist for Utah and Colorado. **Douglas L. Reese,** geologist in Rock Springs, becomes Wyoming district geologist.

Edward A. Lyle, Unit Rig & Drilling Co., Tulsa, is new president of the Mid-Continent section of American Society of Mechanical Engineers. Other officers are **Duane E. Marquis,** Phillips Petroleum Co., vice chairman; **Bennett D. Howell,** Public Service Co., secretary; and **Howard R. Sharp,** Phillips, treasurer. Divisional vice chairmen are **Roger W. Clements,** Alco Products, Inc.; **Jack D. Finley,** Nutter Engineering Co.; **D. E. Regenbrecht,** University of Tulsa; and **Dale E. Stauffer,** Public Service.

Dr. Edward G. Baker has been named a research associate in Esso Research & Engineering Co.'s chemicals research division. He has been with the company since 1951.

Dewey E. Williams, assistant general superintendent of the Gulf Coast division of Loffland Brothers Co., has been named superintendent of Argentine operations, which are being carried out under contract to Pan American Argentina Oil Co. **Bob W. Harden** has been transferred from Venezuela to Argentina as assistant superintendent of the drilling program. Loffland has assigned 13 tool pushers, 32 drillers and some special service personnel to Argentina. Special service personnel include **J. A. Kauffmann,** chief engineer; **Richard C. Tucker,** mud engineer; **L. L. Moncus,** chief accountant; **Alberto M. Labarrero,** assistant chief accountant; **Louis E. Johnson,** chief welder; **George D. Stokes,** chief mechanic; and **L. W. Ryan,** warehouseman.

W. J. Christian, supervisor of the Texas Railroad Commission's Kilgore office, has been named supervisor of district 3 in Houston for the Commission. He succeeds **John R. Steele.**

Four new directors have been named to the board of Associated Oil & Gas Co., Inc. They are **Walter N. Maguire,** Stamford, Conn., attorney; his son, **Walter L. Maguire,** a director of Coastal States Gas Producing Co. and Gulf States Development Corp.; **B. T. Parr,** president of Gulf States Development; and **L. M. Fischer,** vice president and general manager of South-Tex-Corp.

M. A. Heany, geologist with Amerada Petroleum Corp. in Billings, Mont., has resigned to join Northern Natural Gas Producing Co. in Billings.

Lee A. Pease has been named head tool pusher of Canadian operations for Loffland Brothers Co., Tulsa. Pease has been with Loffland since 1937.

Marvin L. McCullough, Rivercrest Oil Co., Inc., has been reelected president of the North Texas Oil and Gas Association. Newly elected first vice president is **Netum A. Steed,** Taubert & Steed Drilling Co. and Taubert & Steed Operating Co. **David A. Kimbell,** Alan Drilling Co., has been reelected second vice president; and **George W. Anderson, Jr.,** continues as executive vice president.

C. W. Miller, vice president in charge of manufacturing for Warren Petroleum Corp., has been elected vice president and a director of Midland Gasoline Co.

A. E. Lain, supervisor of the operations and engineering section in Shell Pipe Line Corp.'s Tulsa office, has been transferred to New Orleans as district superintendent. He has been with Shell since 1939.

James N. McNeill has been elected a vice president of Sapphire Petroleums, Ltd., Toronto. McNeill was formerly head of the operations division of Iranian Oil Exploration & Producing Co., one of the two operating companies of the Iranian consortium. He was with Wilshire Oil Co. and Union Oil Co. at one time. Sapphire has also announced opening of a new office in Los Angeles.

Frank McCament, Mount Vernon, Ohio, district superintendent of production for Ohio Fuel Gas Co., has been promoted to general superintendent of production for the company. He will headquarter in Columbus. McCament succeeds **Carl J. Hauck,** who was recently named assistant manager of the production department. **Donald C. Hubbard,** production engineer, has been named assistant general superintendent of production. **Richard G. Cook,** storage engineer, becomes assistant chief geologist. **Robert T. Patridge,** engineering and map office engineer, has been promoted to assistant superintendent of the engineering and map section. In the Mount Vernon district, **Alva M. Petty,** district foreman, will succeed McCament as district superintendent of production. **Cecil Dailey,** construction foreman, moves up to district foreman, succeeding Petty. **Wayne C. Balcom** has been named construction foreman, replacing Dailey.

Homer C. Wilson has been named manager of operations for Texas Butadiene & Chemical Corp., a new position. He will headquarter in Houston. Wilson has been director of supplies since joining Texas Butadiene in 1956. He was formerly manager of the Petrocel division of Celanese Corp.

Harold W. (Duke) Haight, chairman of the board of Carter Oil Co., has been elected a director of Esso Research & Engineering Co. He succeeds **Carl G. Herrington,** Carter vice president, on the Esso Research board. Haight was president of Creole Petroleum Corp. before becoming Carter chairman last month. He has been with Standard Oil Co. (N.J.) and its affiliates since 1927.

Chester L. May, retired senior vice president and a director of Lone Star Gas Co., has been elected a director of Rio Grande Valley Gas Co., Brownsville, Tex. He succeeds the late O. P. Wilson. May is chairman of the board of Arkla Air Conditioning Co. He retired from Lone Star last October.

▶▶▶ Personals

Frank Lindeman, Jr., general manager of oil and gas operations for United Carbon Co., has been elected vice president for gas and oil. **A. G. Treadgold,** president of United Carbon's synthetic-rubber subsidiary,

LINDEMAN

TREADGOLD

United Rubber & Chemical Co., has been named vice president for manufacturing of the parent company. **John H. McKenzie,** head of research and development, has been named vice president for research and development, and **H. B. Lawson,** controller, has been elected financial vice president. Lindeman joined United last year. He was formerly production vice president and a director of Pan American Petroleum Corp.

R. L. Milligan, Pure Oil Co., will head a National Petroleum Council committee making a special survey of U.S. petroleum storage facilities of 25,000 bbl. or more capacity. The study was requested by the Office of Civil and Defense Mobilization. Other committee members are **W. W. Keeler,** Phillips Petroleum Co.; **W. J. Arnold,** Pure Oil Co.; **Vincent M. Brown,** NPC attorney; **Robert O. Anderson,** Malco Refineries, Inc.; **A. F. Barrett,** Mobil Oil Co; **L. A. Cranson,** Honolulu Oil Corp.; **Max M. Fisher,** Aurora Gasoline Co.; **Clyde T. Foster,** Standard Oil Co. (Ohio); **Stark Fox,** Oil Producers Agency of California; **B. A. Hardey,** Hardey Co.; **Harry B. Hilts,** Empire State Petroleum Association; **W. J. Goldston,** Goldston Oil Corp.; **G. B. Hunter,** NPC; **Eugene R. Locke,** Texas Independent Producers and Royalty Owners Association; **H. M. McClure,** National Stripper Well Association; **John L. Matthewman,** Independent Oil Men's Association of New England; **Miles Mills, Sr.,** National Oil Jobbers Council; **Albert L. Nickerson,** Socony Mobil Oil Co., Inc.; **J. R. Parten,** Woodley Petroleum Co.; **Frank O. Prior,** Standard Oil Co. (Ind.); **David Proctor,** Gulf Oil Corp.; **M. J. Rathbone,** Standard Oil Co. (N.J.); **M. H. Robineau,** Frontier Refining Co.; **D. T. Staples,** Tidewater Oil Co.; **Everett Wells,** Ashland Oil & Refining Co.; **John H. White,** Port Oil Co.; and **Howard D. White,** Liquefied Petroleum Gas Association. **Hans C. Jensen,** Office of Oil and Gas, will be government co-chairman of the committee.

Sinclair Oil & Gas Co. has expanded its offshore division in New Orleans to include the New Orleans and Lafayette, La., district offices. New Orleans and Lafayette districts were previously under the Houston division. **R. A. Wright,** vice president and division manager, is in charge of the New Orleans division. **Joe T. Ray,** Lafayette district landman, will be division exploration superintendent. **Albert P. Micciche,** Houston senior landman, succeeds Ray in Lafayette. **Robert D. Sprague,** formerly New Orleans division geologist, has been promoted to assistant chief geologist for the company and transferred to Tulsa. **Charles C. Barber,** Jackson Miss., division geologist, succeeds Sprague in New Orleans. In other changes in the New Orleans division, **Richard J. Schneider,** Lafayette senior landman, has been named district landman in New Orleans. **Donald L. Frazee,** intermediate geologist in Lafayette, has been transferred to New Orleans, and **James R. Arnold,** New Orleans senior geologist, has moved to Lafayette. Sinclair has also made changes in assignments in the Jackson division. **Robert L. Schmidt,** senior geophysicist, has been promoted to division geophysicist. He succeeds **William J. Robinson,** who recently was promoted to staff geophysicist in Tulsa. **William H. Hollingsworth,** Jackson district geologist, succeeds Barber as division geologist. **George R. White,** senior geologist in Jackson, replaces Hollingsworth. **L. Graham Hughes,** intermediate geologist in Jackson, has been promoted to senior geologist, replacing George White. **James L. White,** junior geologist, has been named intermediate geologist.

James R. Day, formerly geologist with Fuhrman Petroleum Corp., has opened offices as consulting geologist in Midland, Tex. Day was a vice president of Statex Petroleum Co. before joining Fuhrman and was with Amerada Petroleum Corp. for many years.

F. O. Griffin, treasurer and vice president of Western Nuclear Corp., Rawlins, Wyo., has resigned to join Colorado Oil & Gas Corp., Denver, as assistant to the president. He will continue as a director of Western Nuclear.

Andrew Yelenosky, geologist with Continental Oil Co., has been transferred to Pittsburgh from Ardmore, Okla. **John Stewart,** geologist, has moved to Pittsburgh from Corpus Christi, Tex. **Charles Tucker,** geologist, has been transferred to Ardmore, Okla., from Oklahoma City.

Milton M. Cooke, president of Milton M. Cooke & Associates, Houston petroleum engineering firm, and **James E. Holden,** consultant, have formed Cooke & Holden, Inc., a new Houston consulting company. The company will specialize in producing-property management.

Jesse Kincheloe, geologist, formerly with Felmont Oil Corp., has joined Producers Pipe Line Co.

Jack Christie, geologist with Sinclair Oil & Gas Co., has been transferred to Evansville, Ind., from Tulsa.

Melvin M. Tongish, petroleum engineer, has been named production superintendent of Creole Petroleum Corp.'s eastern division in Venezuela.

A. H. R. Grimsey, fields manager for Basrah Petroleum Co., Ltd., has been appointed general manager of the company. He succeeds **J. J. Page.**

Lewis W. MacNaughton, chairman of the board of DeGolyer & MacNaughton, Dallas, has been elected a director of Arkansas Fuel Oil Corp. He succeeds the late Vincent J. Nolan. **M. J. Lasseigne,** treasurer of Arkansas Fuel Oil Corp. and Arkansas Pipeline Corp., has been elected a vice president of both companies.

M'NAUGHTON

Coe J. Rost, manufacturing coordinator in Amoco Chemicals Corp.'s manufacturing department, has been transferred to Standard Oil Co. (Ind.) as manager of purchasing development.

R. N. Tuttle, Elk City, Okla., district mechanical engineer for Shell Oil Co., has been transferred to New York.

Gene Sharkey has been promoted to division supervisor in the fuel-products terminaling department at Esso Standard Oil Co.'s Bayonne, N. J., refinery.

C. U. Daniels, retired chairman of Royalite Oil Co., Ltd., and **Bart W. Gillespie,** vice president and a director of Home Oil Co., have received honorary life membership certificates

Personals

in the Canadian Petroleum Association.

Hardin E. Littell, trainee with Cities Service Oil Co. in Pampa, Tex., has been promoted to production engineer in Wichita Falls, Tex.

Robert H. Milbrath, vice president and a director of Esso Export Corp., has been elected executive vice president. He succeeds **George H. Freyermuth,** who has resigned. **G. D. Comnas,** vice president and general manager of cargo sales for Esso Export, has been elected a director. **D. O. Swan,** Esso Standard Oil Co.'s manager of the petroleum specialties department, moves to Esso Export as vice president and manager of cargo sales, succeeding Comnas. Swan will be succeeded at Esso Standard by **Charles O. Peyton,** assistant general manager of the petroleum specialties department.

Lewis P. Kilbourne, head of the New Orleans office of Gulf Coast Leaseholds, Inc., Houston, has been promoted to chief geologist for the company.

C. Francis Knighton, formerly plant engineer with Valvoline Oil Co. in Freedom, Pa., has joined Union Chemical Co., Inc., as plant manager in Shreveport, La.

Jeff Boucher, intermediate valuation engineer in Sinclair Oil & Gas Co.'s economics department, Tulsa, has been promoted to senior valuation engineer. He succeeds **Marshall F. Stiles, Jr.,** who was recently promoted to staff valuation engineer. **Jerry Holder,** formerly with Core Laboratories, Inc., in Oklahoma City, has joined Sinclair to succeed Boucher.

Theodore Marks has been promoted to senior project engineer for Neches Butane Products Co. in Port Neches, Tex. Marks was formerly assigned to work on design and construction of new butadiene production facilities.

D. S. Purnell, manager of operations for Laurel Pipe Line Co., has been elected vice president in charge of operations. Purnell was division superintendent of products pipelines for Sinclair Pipe Line Co. before joining Laurel in 1957.

Five oil men were honored with citations for service at last week's southern district meeting of API's Division of Production in New Orleans. Receiving the awards were **Bouwe Dykstra,** Shell Oil Co., New Orleans; **A. H. Weyland,** Arkansas Fuel Oil Corp., Shreveport, La.; **T. O. Allen,** Jersey Production Research Co., Tulsa.; **Walter F. Rogers,** Gulf Oil Corp., Houston; and **Dwight Seely,** Sohio Petroleum Co., Houston.

Victor R. Gallagher, Evansville, Ind., independent producer and drilling contractor, has been elected president of the Independent Oil Producers and Land Owners Association, Tri-State. Others taking office at the association's recent annual meeting were **William G. Gorman,** Ryan Oil Co., first vice president; **Bill G. Harmon,** Carmi, Ill., second vice president; **George A. Hoffman,** Henderson, Ky., independent, third vice president; **John R. Lavens, Jr.,** Evansville consultant, secretary; **Kenneth O. Henke,** National City Bank, Evansville, treasurer; and **Elmer L. Hoehn,** executive-secretary.

GALLAGHER

Raymond W. Miller has been named manager of gas supply at Northern Natural Gas Co.'s new Billings, Mont., office, which will be opened in April. Miller was formerly with the U.S Bureau of Mines at Amarillo, Tex.

Deaths

William Perryman Allen, 64, Port Arthur, Tex., union representative for Oil, Chemical, and Atomic Workers International Union, died March 22 in a Houston hospital. Allen had been with OCAW 9 years.

Charles A. Geddes, Jr., 54, corrosion engineer for Cathodic Protection Service, Houston, died March 21 in an accident on an offshore rig near Abbeville, La. Geddes had been with Cathodic Protection since 1952.

H. W. Mack, supervisor in Puerto Miranda, Venezuela, for Cia. Shell de Venezuela, died March 13 after a heart attack. Mack retired a year ago as superintendent of Puerto La Cruz after 36 years with Mene Grande Oil Co.

Ralph E. Schneider, 47, Tulsa geologist, died March 23 in a car-truck accident near Parsons, Kans. He was with Shell Oil Co., Thirty-Six Oil Co., and Ohio Oil Co. before becoming a consultant.

John C. Gallivan, 45, Denver district manager for J. Terteling & Sons, drilling contractors, died March 19 in Georgetown, Colo. Gallivan suffered a heart attack while removing tire chains from his car. He was returning home from a skiing trip.

Franklin Walter, Jr., 45, pilot for Luling Oil & Gas Co., San Antonio, was killed and two company executives injured last week when their plane crashed after takeoff at San Antonio's International Airport. Vice President **T. N. Davey,** 66, was critically injured in the crash. **C. E. Edgerton,** 51, chief geologist, suffered second degree burns.

Paul Weeks Litchfield, 83, honorary chairman of the board of Goodyear Tire & Rubber Co. since his retirement last October, died March 18 in a Phoenix, Ariz., hospital. Litchfield joined Goodyear in 1900 as superintendent of production. He was elected president of the company in 1926 and chairman in 1930. He stepped down as chief executive officer in 1956.

M. R. (Army) Armstrong, service representative with Ideco, Inc., died March 21 after a heart attack. Armstrong joined Ideco in 1947. He had been with the central service department in Torrance, Calif., Dallas, and Beaumont, Tex. His transfer to Long Beach, Calif., from Beaumont had been announced a few weeks before his death.

Jack T. Worthington, 77, retired general superintendent of construction and operations for Petreco division of Petrolite Corp., died recently in Long Beach, Calif. He retired in 1948.

Harvey Manford Edens, 63, retired foreman with O. R. Howard Oil Co., died March 20 in Tulsa after a 2-year illness.

John B. Cowden, Sr., 67, Texas and Oklahoma independent operator, died March 25 in a Dallas hospital after a brief illness. Cowden was active in East Texas, West Texas, and southern Oklahoma oil developments through Clark & Cowden Oil Co., which he formed in 1919 with the late R. L. Clark.

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For handling such variables as LIQUID LEVEL *(in feet, inches and eighths; metric in millimeters or feet and hundredths)*; TEMPERATURE *(one degree increments to three digits)*; PRESSURE *(three digits in one or ten pound increments)*; FLOW VOLUME *(to five or six digits in one or ten barrel increments or other volume units)*. The system will also log the status and provides for the control of operating equipment such as valves, pump motors, etc. Time data and identification points can be recorded as needed to suit the operation. Flexibility is one of the system's outstanding features since it allows the use of standard proven systems for custom applications that would otherwise require special-built, untested units.

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Almost any type of logging program can be arranged by using standard sub-assemblies: Logging on prearranged form, with or without point identification, or on random order basis with point identification •••••• Entry of one or more lines of data for log cycle••••••Time entry at start of each line entry. All numbers, fractions and letters available for logging; carriage shift; black-red ribbon shift provisions.

FLEXIBLE OPERATION

Manual operation without Data Logging by means of a telephone dial which obtains a visual indication of any point included in the system ••••• Manual control of Scanning-Logging Cycle can be started at any time by the operator at any desired point ••••• Automatic Control of Scanning-Logging Cycle can be initiated on a time programmed basis by time clock control.

FOR A COMPLETE ENGINEERING APPROACH TO TELEMETERING SYSTEMS REQUEST PACKAGE 24

THE VAPOR RECOVERY SYSTEMS COMPANY • COMPTON, CALIFORNIA

Lower imports will aid drilling

BY JOHN C. CASPER

DRILLING may get a bigger boost from the "better feeling" created by the import-control program than from actual gains in income.

Sharp reductions in well completions for the past 2 years have been due to several factors. First, drilling was very high in proportion to income from oil and gas for the years 1954, 1955, and 1956. Note on the chart that points for these years were well above the line.

Despite the increase in producer income in 1957, there was a very sharp drop in drilling. For 1958, adjusted income was slightly higher than for 1956, but completions dropped more than 9,000 wells. Some of the drop represented correction for high drilling rates in the 1954-56 period.

Part of the drilling losses in 1957 and 1958 may have been due to the increased flow of capital to exploration in foreign areas. Growth in Venezuelan exploration is an example but represents only a part of the shift of capital to foreign areas. Venezuela opened new areas for exploration, starting late in 1956. In the last half of 1956 and the first half of 1957, a total of $668,000,000 was collected in bonuses and initial exploration taxes.

Oil men from this country also have important exploration programs in Africa and the Middle East. There have been no published figures on capital flow to foreign exploration, but the total has been significant. Many of these leases will pay out and become sources of income for further foreign exploration.

In addition to the lure of high production rates in some foreign areas, the flow of capital was influenced by the uncertainty of the market for domestic crude. Total imports increased 18.6% in 1955, 15.1% in 1956, 9.7% in 1957, and 7.7% in 1958. In contrast, demand for domestic crude gained only 6.3% in 1955 and 5.3% in 1956. For the past 2 years use of domestic crude has gone down. There was a slight decrease of 0.2% in 1957 and a further drop of 5.4% in 1958.

Demand for domestic crude in 1958 was only 5.8% more than the average for 1954. Total imports showed a gain of 61.1% for the same period.

The new import-control program will result in an over-all reduction in imports for 1959 and will tie future growth in imports to increases in demand.

This assurance of a definite portion of the total market for petroleum in this country will give the producer a better estimate of his expected income for the year. After 2 years of shrinking markets, even a small gain looks good if it is a part of an extended program.

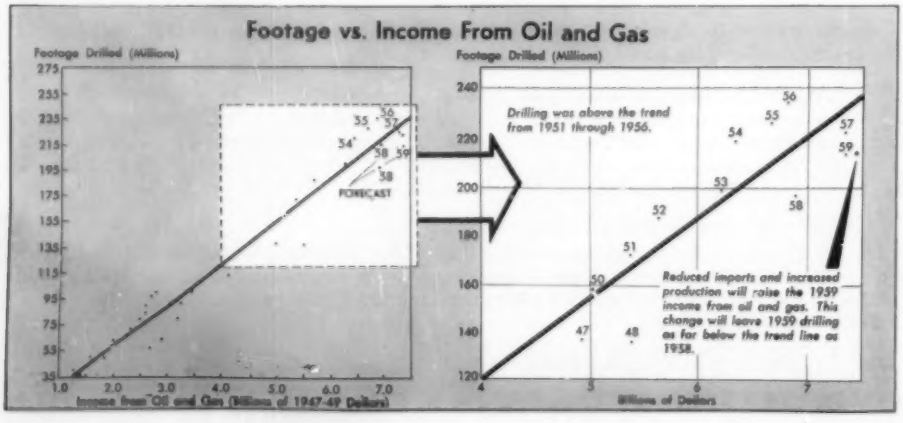
Operators reported at the first of the year that planned drilling for the year amounted to about 214 million feet. The Journal's forecast of crude and gas production for the year had an estimated value of 9.3 billion dollars. Corrected for inflation to a 1947-49 base, the total would be a little over 7.3 billion dollars.

The Journal's original forecast of production assumed some limitation on imports, but the announced program may add as much as 125,000 bbl. daily to crude production.

This increase would give producers an extra 138 million dollars or about 110 million dollars after correction to the 1947-49 base. The additional income represents a gain of about 1.5%, enough to make 1959 a record year for income. But, it can't be better than the fifth-best year for drilling.

A quick look at the highlights . . .

	LATEST WEEK	Change from WEEK AGO		Change from YEAR AGO	
Production	7,218,425	UP	57,093	UP	968,590
Crude stocks	255,672,000	DOWN	329,000	DOWN	28,174,000
Completions	895	UP	57	UP	40
Refinery runs	8,082,000	DOWN	201,000	UP	766,000
Gasoline stocks	212,139,000	UP	1,849,000	DOWN	4,768,000
Kerosine stocks	18,333,000	DOWN	655,000	UP	1,155,000
Distillate stocks	77,194,000	DOWN	1,682,000	DOWN	1,255,000
Residual stocks	55,082,000	UP	72,000	UP	69,000
Four-product stocks	362,748,000	DOWN	416,000	DOWN	4,799,000
Total imports	1,931,800	UP	193,900	UP	363,900

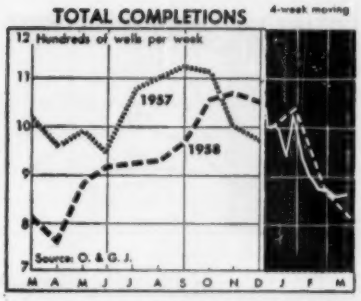

Footage vs. Income From Oil and Gas
Footage Drilled (Millions)
FORECAST
Income from Oil and Gas (Billions of 1947-49 Dollars)
Footage Drilled (Millions)
Drilling was above the trend from 1951 through 1956.
Reduced imports and increased production will raise the 1959 income from oil and gas. This change will leave 1959 drilling as far below the trend line as 1958.
Billions of Dollars

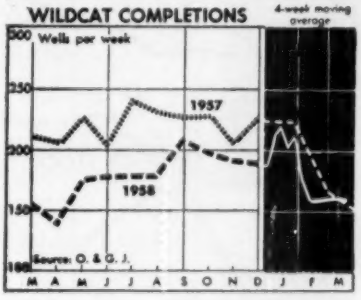
The right-hand chart is an enlargement of part of the one on the left. The line represents the relationship between oil and gas income and total footage drilled for the year. Points above the line show drilling rates that are high in proportion to income. Points below the line indicate a low ratio of drilling to income. Income has been corrected for inflation. The two points for 1959 show plots of original and revised forecasts.

Active Rotary Rigs

	3-23-59	3-16-59	3-24-58
Alabama	8	7	6
Arkansas	17	19	16
Arizona	1	0	0
California	99	94	77
Land	96	91	(†)
Offshore	3	3	(†)
Colorado	28	27	32
Florida	3	2	2
Illinois	17	14	18
Indiana	7	4	3
Iowa	2	3	3
Kansas	130	124	68
Kentucky	6	4	1
Louisiana	324	301	316
North	33	28	26
S.-Inland waters	142	134	(‡)
S.-Land	111	99	230
Offshore	38	40	60
Maryland	1	1	0
Michigan	13	17	7
Mississippi	68	59	32
Montana	19	17	18
Nebraska	25	23	13
Nevada	0	0	0
New Mexico	108	93	100
New York	0	0	1
North Dakota	43	36	38
Ohio	1	1	0
Oklahoma	215	217	147
Pennsylvania	11	13	12
South Dakota	1	1	0
Texas	759	725	723
S.-Inland waters	8	6	(‡)
S.-Land	165	156	160
Offshore	0	1	2
North-East	158	156	(†)
West Central	264	252	(†)
West	164	154	(†)
Utah	39	35	37
Washington	0	0	2
West Virginia	5	5	3
Wyoming	53	53	38
Total U. S.	2,003	1,895	1,713
Western Canada	199	215	180
Eastern Canada	0	0	2
Grand total	2,202	2,110	1,895

Hughes Tool Co. †Comparisons not available due to change in method of reporting. ‡Included in South-Land.



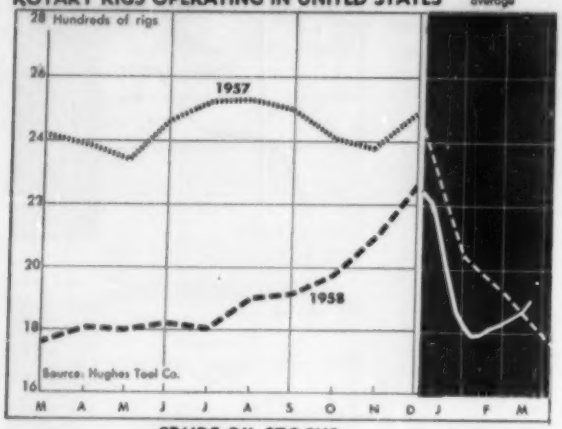


WEEKLY WELL COMPLETIONS . . . WEEK ENDED MARCH 21, 1959

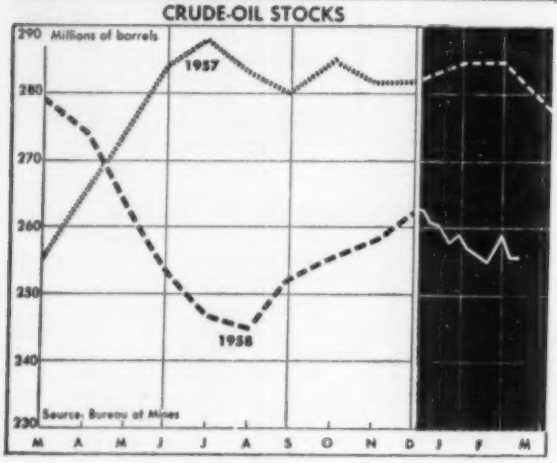
	Total wells							Cum.		Total wildcats					Cum.	
	Total	Crude	Cond.	Gas	Dry	Service	Footage	1959	1958	Total	Crude	Cond.	Gas	Dry	1959	1958
Alabama	3	3	0	0	0	0	34,771	28	19	0	0	0	0	0	4	7
Arkansas	12	7	0	0	5	0	38,691	208	151	0	0	0	0	0	35	37
California	24	13	0	0	10	1	131,650	348	464	7	1	0	0	6	81	85
Colorado	7	1	0	1	5	0	40,842	164	168	6	0	0	1	5	90	91
Illinois	46	21	0	0	19	6	102,225	501	450	11	2	0	0	9	84	86
Indiana	7	1	0	0	6	0	14,646	142	161	3	0	0	0	3	44	55
Kansas	77	42	1	1	32	1	260,796	892	936	13	2	0	0	11	204	185
Kentucky	14	5	0	4	5	0	26,749	380	190	0	0	0	0	0	42	26
Louisiana	62	29	4	0	29	0	508,273	809	748	3	1	0	0	2	109	91
North	20	7	0	0	13	0	69,728	292	266	1	0	0	0	1	52	36
South	39	22	3	0	14	0	404,217	431	382	1	1	0	0	0	54	49
Offshore	3	0	1	0	2	0	34,328	86	100	1	0	0	0	1	3	6
Michigan	10	3	0	4	3	0	27,173	125	72	1	0	0	0	1	37	28
Mississippi	10	5	0	0	5	0	106,103	141	90	2	0	0	0	2	64	49
Montana	2	1	0	0	1	0	12,846	59	91	1	0	0	0	1	25	43
Nebraska	18	6	0	0	12	0	108,107	159	163	8	0	0	0	8	72	80
New Mexico	29	18	0	2	9	0	122,126	382	501	4	1	0	0	3	40	75
New York	0	0	0	0	0	0	0	74	121	0	0	0	0	0	4	9
North Dakota	6	4	0	0	2	0	32,730	94	102	1	0	0	0	1	24	36
Ohio	20	6	0	6	6	2	44,428	202	212	0	0	0	0	0	5	3
Oklahoma	125	59	4	5	55	2	421,100	1,301	1,622	19	4	0	0	15	210	222
Pennsylvania	55	14	0	29	5	7	186,044	114	23	2	0	0	1	1	3	4
Texas	327	191	11	18	102	5	1,428,382	4,110	4,221	67	8	2	0	57	783	892
District 1	21	11	0	0	10	0	44,098	263	200	5	0	0	0	5	69	80
District 2	9	3	2	1	3	0	54,772	161	129	3	1	0	0	2	49	34
District 3	15	9	2	0	4	0	86,265	237	287	4	0	2	0	2	69	52
District 4	12	3	2	2	5	0	65,079	272	260	4	0	0	0	4	81	85
East	18	7	1	0	10	0	103,356	243	305	6	0	0	0	6	60	87
District 7-B	39	18	0	3	18	0	129,975	530	542	10	2	0	0	8	144	167
West	116	82	2	5	24	3	600,800	1,309	1,257	15	1	0	0	14	144	195
District 9	65	35	0	6	22	2	206,054	783	920	17	4	0	0	13	135	166
District 10	32	23	2	1	6	0	137,983	312	321	3	0	0	0	3	32	26
Utah	12	7	0	0	5	0	70,758	90	106	5	1	0	0	4	23	19
West Virginia	11	0	0	10	1	0	27,255	160	174	0	0	0	0	0	5	6
Wyoming	18	5	0	2	11	0	89,586	191	191	7	0	0	1	6	74	66
Miscellaneous	0	0	0	0	0	0	0	15	28	0	0	0	0	0	12	22
Total U. S.	895	441	20	82	328	24	3,835,281	10,689	11,004	160	20	2	3	135	2,074	2,217
Prev. week	838	426	23	60	298	31	3,590,831	.....	.....	154	16	4	0	134	.....	.....
Cum. 1959	10,689	5,390	275	738	3,998	288	45,333,117	.....	.....	2,074	225	28	68	1,753	.....	.....
Western Canada	56	25	0	3	28	0	262,564	531	572	20	2	0	0	18	198	209

PRODUCTION

ROTARY RIGS OPERATING IN UNITED STATES



CRUDE-OIL STOCKS



CRUDE-OIL STOCKS BY STATES OF ORIGIN*
(Thousands of barrels)

	3-14-59	3-7-59	3-15-58
Pennsylvania	2,515	2,507	2,899
Other Appalachian	1,336	1,556	1,556
Illinois, Indiana, Michigan	8,405	8,741	10,426
Nebraska and North Dakota	2,156	2,158	2,446
Kansas	8,711	8,822	9,462
Oklahoma	16,439	15,674	18,391
Arkansas	1,856	1,933	2,846
Louisiana	17,727	17,702	19,551
North	2,909	2,885	3,287
South	14,818	14,817	16,264
Mississippi, Alabama, Florida	2,629	2,541	2,387
New Mexico	8,465	8,741	8,189
Texas	113,141	112,938	127,321
East Texas	8,574	8,916	8,555
West Texas	56,374	55,425	56,166
Texas Gulf	18,712	19,612	27,666
Other Texas	29,481	28,985	34,934
Wyoming	12,870	13,042	15,702
Other Rocky Mountain	9,353	9,132	7,085
California	34,793	35,044	38,703
Foreign	†15,276	15,470	16,882
Total	**255,672**	256,001	283,846

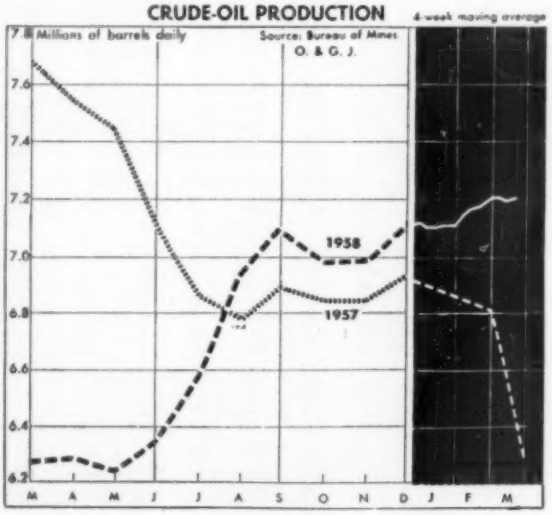
*Bureau of Mines. †Includes 4,976,000 bbl. in California.

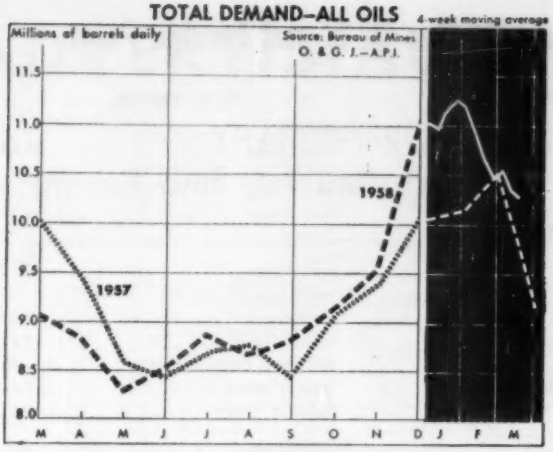
DAILY AVERAGE PRODUCTION FOR WEEK

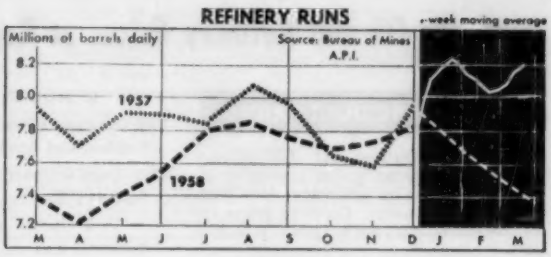
	March 21, 1959			March 14
	Crude oil	Lease condensate	Total	total
Alabama	16,325	.....	16,325	16,300
Arkansas	80,600	200	80,800	79,800
California	839,600	.....	839,600	841,200
Colorado	128,000	.....	128,000	128,900
Eastern	42,000	.....	42,000	41,800
Florida	1,175	.....	1,175	1,175
Illinois	229,700	.....	229,700	233,500
Indiana	31,600	.....	31,600	31,400
Kansas	†338,550	.....	†338,550	†307,532
Kentucky	63,200	.....	63,200	67,300
Louisiana	850,550	109,100	959,650	959,550
North	112,050	4,100	116,150	116,050
South	738,500	105,000	843,500	843,500
Michigan	25,700	.....	25,700	22,700
Mississippi	116,800	5,250	122,050	122,050
Montana	82,000	.....	82,000	80,500
Nebraska	59,700	.....	59,700	59,400
Nevada	100	.....	100	100
New Mexico	287,000	6,000	293,000	293,000
North Dakota	42,900	.....	42,900	40,300
Oklahoma	†566,350	.....	†566,350	†539,400
Texas	2,773,000	73,300	2,846,300	2,846,300
Dist. 1	43,000	3,200	46,200	46,200
Dist. 2	110,000	8,400	126,400	126,400
Dist. 3	373,000	34,400	407,400	407,400
Dist. 4	200,000	9,000	209,000	209,000
Dist. 5	32,000	400	32,400	32,400
Dist. 6	123,000	7,600	130,600	130,600
East Texas Field	159,000	.....	159,000	159,000
Dist. 7-B	145,000	150	145,150	145,150
Dist. 7-C	133,000	3,650	136,650	136,650
Dist. 8	1,134,000	3,300	1,137,300	1,137,300
Dist. 9	206,000	2,200	208,000	208,000
Dist. 10	107,000	1,000	108,000	108,000
Utah	112,500	.....	112,500	110,000
Wyoming	337,100	.....	337,100	339,000
Others	‡125	.....	‡125	‡125
Total U.S.	7,024,575	193,850	**7,218,425**	7,161,332
Change from prev. week, up			**57,093**	
Canada	†530,900	.....	†530,900	†521,200
Total U.S. production—Jan. 1-March 21				573,592,525 bbl.
Same period last year (crude plus cond.)				*535,397,927 bbl.

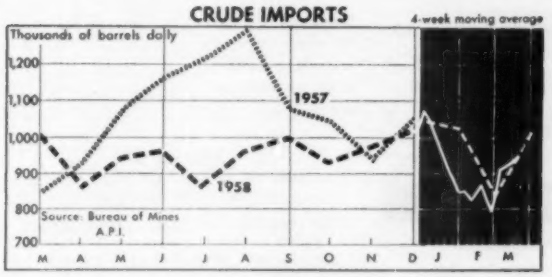
*Includes 13,168,650 bbl. condensate. †Week ended previous Monday. ‡South Dakota and Washington.

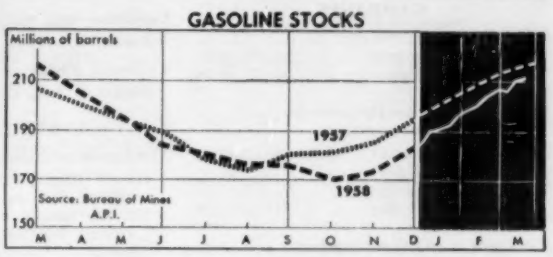
CRUDE-OIL PRODUCTION

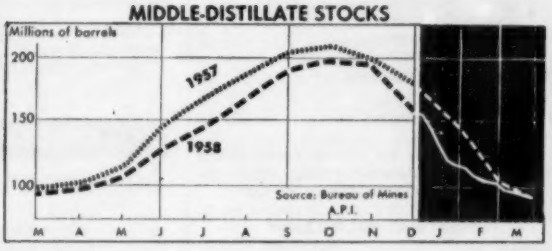


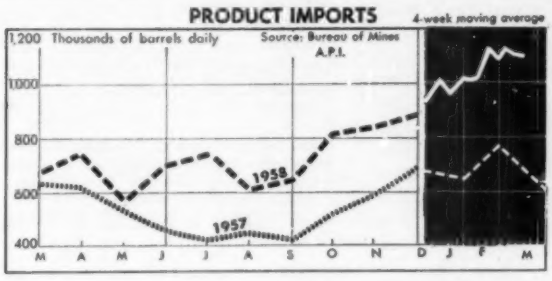

TOTAL DEMAND–ALL OILS
4-week moving average
Millions of barrels daily
Source: Bureau of Mines
O. & G. J.–A.P.I.
1957
1958
M A M J J A S O N D J F M

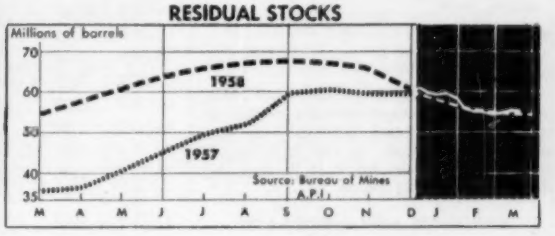












API REFINERY REPORT, MARCH 20, 1959

(Thousands of barrels)

District—	Daily avg. runs	Daily average production: Gaso.*	Kero.	Dist.	Resid.	Stocks‡: Gaso.†	Kero.	Dist.	Resid.	Bureau of Mines, March 1958: Daily avg. runs	Daily average production: Gaso.*	Kero.	Dist.	Resid.
East Coast	1,170	571.2	35.7	387.8	153.0	45,786	8,101	26,258	12,023	1,126	468.7	36.1	299.7	204.0
Appalachian:														
Dist. 1	106	43.4	2.9	27.3	9.0	4,912	363	1,669	208	92	39.0	5.1	23.6	9.8
Dist. 2	106	45.4	8.3	16.4	15.8	2,792	300	739	272	106	46.7	6.9	21.5	12.0
Ind., Ill., Ky.	1,463	750.6	66.8	339.6	176.7	38,623	3,378	10,591	3,223	1,358	681.0	80.1	286.9	169.1
Minn., Wis., Dak.	106	53.7	4.4	27.6	13.0	6,472	515	3,150	400	96	42.1	4.5	26.7	12.9
Okla., Kans., Mo.	743	415.1	15.4	186.6	28.4	22,876	751	6,176	943	627	340.0	13.0	160.5	30.3
Inland Texas	279	188.7	6.9	43.6	22.6	8,185	321	1,386	2,128	248	182.2	9.0	46.1	21.0
Texas Gulf Coast	1,913	922.3	100.0	533.4	203.3	27,943	2,027	8,286	5,231	1,716	813.3	108.6	437.9	184.7
La. Gulf Coast	691	405.4	18.0	182.4	45.6	12,260	1,437	4,108	1,397	600	335.9	59.8	133.9	45.0
N. La. and Ark.	98	50.0	3.9	21.3	4.4	4,981	495	1,552	71	101	46.4	6.5	21.0	8.9
Rocky Mountain:														
New Mexico	23	12.0	0.1	3.1	2.7	712	30	178	22	17	7.3	0.2	3.4	2.8
Other Rky. Mt.	291	126.6	1.6	68.7	36.0	7,357	217	2,518	930	237	115.1	1.1	56.0	28.4
West Coast	1,093	500.2	7.7	234.6	323.6	29,240	398	10,583	28,234	1,032	467.9	5.7	132.8	286.2
Mar. 20, 1959	8,082	4,084.6	271.7	2,072.4	1,034.1	212,139	18,333	77,194	55,082	7,356	3,585.6	336.6	1,650.0	1,015.1
Mar. 13, 1959	8,283	4,061.7	330.7	2,027.0	1,047.7	210,290	18,988	78,876	55,010	.....	.....	.....	.....	.....
Mar. 21, 1958	7,316	3,571.0	336.0	1,655.3	1,028.1	216,907	17,178	78,449	55,013	.....	.....	.....	.....	.....

*At refineries including natural blended. †Finished and unfinished. ‡At refineries, bulk terminals, in transit, and in pipelines.

Crude-Oil and Refinery Prices at Representative U. S. and Foreign Points

REFINED-PRODUCT PRICES

Following quotations are for refinery products in cents per gallon moving in interstate shipments on Wednesday each week unless otherwise noted. Crude-oil prices are per barrel at the wells unless otherwise listed.

GASOLINE*

Mid-Continent (Group 3):

Regular (89 octane)	11.625-12.00
Premium (99 octane)	14.625-15.00

Gulf Coast (cargoes for coastwise or export movements):

Regular (90 octane)	10.00-10.25
Regular (92 octane)	10.25-10.50
Premium (97 octane)	11.375-11.75
Premium (98 octane)	11.50-11.75

California (rack) (Los Angeles):

Regular (88 octane)	12.65
Premium (94 octane)	13.65
Premium (98 octane)	14.65

Caribbean area (cargoes):

Regular (87 octane)	9.875
Premium (97 octane)	11.625

*Quotations are for octanes shown. Prices usually vary with octane ratings within the regular, premium, and aviation grades.

NATURAL GASOLINE*

Group 3:

Grade 26-70	4.5

Breckenridge:

Grade 26-70	4.0

*If 26-70 natural is considered as 100%, prices for lower-vapor-pressure grades increase 2.5% for each unit drop in Reid vapor pressure down to and including 16 lb. Prices for grades below 16 lb. may vary slightly by areas or plants.

KEROSINE AND DISTILLATE

Mid-Continent (Group 3):

★ Kerosine 42-44	10.50-10.75
★ Diesel oil (58 d.i. and above)	10.25-10.50
★ Distillate No. 1	10.25-10.50
★ Distillate No. 2	9.50-9.75

Gulf Coast (cargoes):

Kerosine 41-43	10.375
Distillate No. 2	9.875

New York Harbor (barges):

Kerosine 41-43	11.50
Distillate No. 2	11.00
Diesel fuel, 48-52 d.i.	11.25

Caribbean area (cargoes):

Distillate No. 2	9.875

WAX (LB.)

Oklahoma (Group 3):

132-135 A.m.p. (semi-refined) in tank car	6.50

New York (export):

126-130 A.m.p. crude-scale (solid in bags or barrels)	7.35

★Denotes change from previous week.

RESIDUAL FUEL (BBL.)

Mid-Continent (Group 3):

Residual fuel (max. 1% S)	$2.00-2.05

Gulf Coast (cargoes):

Bunker C fuel	$2.00

New York Harbor (barges):

Bunker C fuel	$2.37

Caribbean (cargoes):

Bunker C	$2.00

California (rack):

Bunker C fuel, Los Angeles	$2.15

LUBRICATING OILS

Mid-Continent (Group 3):

150-160 bright stock, solvent refined, 0-10 pp., 95 v.i.	23.0
200 vis. neutral oil, solvent refined, 0-10 pp., 95 v.i.	20.5

Pennsylvania Grade:

145-155 vis. at 210, bright stock, 8 color, 25 p.t.	22
200 vis. neutral (180° at 100°), 25 p.t.	21

CRUDE-OIL PRICES

GRAVITY SCHEDULE

	Signal Hill, Calif.	Oklahoma*	Gulf Coast Tex.†	West Tex.‡ N.M.	Wyo. (sour)
14-14.9	$1.86	....	....	....	....
15-15.9	1.95	....	....	....	$1.81
16-16.9	2.04	....	....	....	1.86
17-17.9	2.13	....	....	....	1.91
18-18.9	2.23	....	....	....	1.96
19-19.9	2.32	....	....	....	2.01
20-20.9	2.41	$2.49	....	$2.35	2.06
21-21.9	2.50	2.52	....	2.38	2.11
22-22.9	2.60	2.55	....	2.41	2.16
23-23.9	2.69	2.58	$3.44	2.44	2.21
24-24.9	2.78	2.61	3.46	2.47	2.26
25-25.9	2.84	2.64	3.48	2.50	2.31
26-26.9	2.90	2.67	3.50	2.53	2.36
27-27.9	2.95	2.70	3.52	2.56	2.49
28-28.9	3.01	2.73	3.54	2.59	2.54
29-29.9	3.07	2.76	3.56	2.62	2.59
30-30.9	3.12	2.79	....	2.65	2.63
31-31.9	3.20	2.82	....	2.68	2.67
32-32.9	3.27	2.85	....	2.71	2.71
33-33.9	3.34	2.88	....	2.74	2.75
34-34.9	3.41	2.91	....	2.77	2.79
35-35.9	3.47	2.94	....	2.80	2.83
36-36.9	3.52	2.97	....	2.83	2.87
37-37.9	3.56	2.99	....	2.86	2.89
38-38.9	....	3.01	....	2.89	2.91
39-39.9	....	3.03	....	2.92	2.93
40-40.9	....	3.05	....	2.95	2.95

*Another Oklahoma (sweet) schedule has a top of $3.08 with gravity variations to $2.52 for below 20°. †Low cold test crude. ‡Sour.

Effective dates of broad changes: California, 1-26-59; East of California, January 3-10, 1957; Pennsylvania Grade 12-22-58

FLAT PRICES

Louisiana:

Sweet Lake	$3.00

Texas:

East Texas	3.25
Conroe	3.53
Van	3.08

Pennsylvania Grade:

Bradford	4.05
Middle District	3.87
Southwest Pennsylvania	3.58
West Virginia	3.40
Buckeye Grade	3.25

Illinois Basin	3.00

Canada:

★ Leduc-Woodbend	2.53
★ Redwater (Alta.)	2.42
★ Smiley (Sask.)	2.16
★ Pembina	2.38

FOREIGN

Venezuela:

Cumarebo, 48°-49.9°, Tucupido	3.51
San Joaquin, 41°-41.9°, Puerto La Cruz	3.25
Oficina, 35°-35.9°, Puerto La Cruz	2.90
Tia Juana medium, 26°-26.9°, Amuay*	2.40
Quiriquire, 16.0°-16.4°, Caripito	2.15
Lagunillas heavy, flat, Las Piedras*	2.10
Bachaquero, flat, 15°-16°, Las Piedras*	1.93

Prices for all crudes of 24° or lighter vary 2 cents per degree change, up or down. All crudes heavier than 24° vary 2.5 cents per half-degree gravity change.

*Also available at La Salina at 3 cents per barrel less.

Middle East, Persian Gulf (cargoes f.o.b. lifting port):

Arabian, about 34°, Ras Tanura	$1.89
Iranian, 34.0°-34.9°, Bandar Masur	1.86
Iranian, 34.0°-34.9°, Abadan	1.81
Iraq, 36.0°-36.9°, Fao	1.82
Kuwait, 31.0°-31.9°, Mina-al-Ahmadi	1.67
Qatar, about 41°, Um Said	2.05

Middle East, E. Mediterranean:

Arabian, about 35°, Sidon	2.29
Iraq, about 35°, Tripoli, Banias	2.29

Far East (cargoes, f.o.b. Lutong, Sarawak):

★ Seria Light, 37°	2.57

TANKER RATES PER LONG TON

(Latest reported spot fixtures)

★ Gulf-U.S.N.H., dirty (USMC —22.5%)	$2.21
★ Carib.-U.S.N.H., dirty (ARTS —52.5%)	1.31
★ P.G.-U.K., dirty (Scale—75%) (18s. 3d.)	2.56
★ E. Med.-U.K., dirty (Scale—62.5%) (10s. 8d.)	1.49

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FOR SALE EQUIPMENT

FOR SALE—ZC52 Fairbanks Morse engine with clutch and 2B13 sheave—used on light well only 9 months—like new. Box L-268, The Oil and Gas Journal, Tulsa, Oklahoma.

RA-2 CLARK, 200 HP. RA-32 Clark, 300 hp. New spare parts. Alfred B. Kern, 305 Kennedy Bldg., Tulsa, Okla.

DRILLING RIG 500-3,000 ft. Double drum Cardwell and Mast Trailer mounted incl. complete drilling equip. All good condition. Priced to sell. 606 Washington, Alhambra, Calif., AT 2-8969.

EXCELLENT 5,000' Rotary Rig Complete, Bargain Price. 15,000' 4½" Grade D & E Full Hole Extra Good Drill Pipe. Don Harman Pipe & Supply, OR 7-4343, Okla. City.

USED PIPE AND USED TANKS—For Sale. Rogers & Wright, Incorporated, 216 West Second Street, Tulsa, Oklahoma; 710 Peoples Building, Charleston, West Virginia.

WE HANDLE all kinds of Production Equipment and have a good stock of Pumping Units for 4,000 foot to 5,000 foot wells. S. E. Frogge Equipment Co., 630 S.E. 29th Street, Oklahoma City, Oklahoma. Phones ME 2-0401, ME 4-5518, MU 5-1630.

NEED PIPE?
8" Steel, Wt. 28 lbs., beveled for welding, straight machine cleaned, coated, strictly No. 1 grade. Pittsburgh Testing Lab. report furnished.

Indiana-Ohio Pipe Co.
P. O. Box 323 Phone 3-4674
DECATUR, INDIANA

PIPE FOR SALE
7,000' of 24" OD x ⅜" Wall 94.62# New Prime National Tube Seamless, Grade B, D.R.L., Line Pipe, located Suntide Refinery Company, Corpus Christi, Texas, mill price delivered. Direct inquiries, Box 2205, Tulsa, Oklahoma.

We Own and Offer

Compressors
5—IR XVG-6, XVG-4
1—Clark RA-8
3—Clark RA-5, RA-3

Exchangers & Heaters
4—Petrochem ½-1¼ Mil. BTU.
10—Steel 200—3,200 sq. ft.
12—Adm. 300—2,400 sq. ft.
6—St. St. & Chr. 250—1,200 sq. ft.
3—Unused U-Tube 340—1,120 sq. ft.

Vessels & Towers

6'x36' 10 Tr. 480#	2'x45' 24 Tr.
4'x50' 12 Tr. 450#	18"x32' 15 Tr. 160#
4'x57' 10 Tr. 250#	4½'x17' 500#
8'x75' 20 Tr. 25#	12'x43' 25#
5'x96' 40 Tr. 135#	5 Pkd. Towers 12"—24"

BRILL EQUIPMENT COMPANY
4101 SAN JACINTO ST., HOUSTON 4, TEXAS, JA 6-1351
2401 THIRD AVE., NEW YORK 51, N. Y.

FOR SALE EQUIPMENT

FOR SALE: Franks 2000 portable rotary rig, A-1 condition. All equipment ready to put in field. Karchmer Pipe and Supply, Centralia, Ill.

SALES AND RENTALS. Used cable drilling and fishing tools, casing, production equipment; from the Southwest's largest stock of oil field supplies. Degen Pipe and Supply Co., Tulsa.

FOR SALE—200,000 feet of 10¾" OD—40# —8V LW No. 1 Grade Line Pipe. T&C or PE. Lundquist Pipe & Supply Co., 325 Wright Bldg., Tulsa, Okla. Ph. LU 5-8850.

CARDWELL L-350 drawworks, diesel powered, Allison torque converter, Parkersburg hydromatic brake. Two pumps, three mud tanks, shale shaker, kelly swivel, rotary table, block and hook, drill collars and nearly complete set drilling tools and accessories. For complete inventory write McClelland Engineers, Inc., 2649 North Main, Houston, Texas.

FOR SALE: CHEAP! Wildcat Drilling Rigs. One (1) #2 National all-steel drilling rig complete with 10" x 60' Sheer Poles with Sheaves and galvanized guy lines, Waukesha gas-gasoline engine, less drilling tools and cables. One (1) #3 National, similar to above, except short band wheel. Will take $3,000.00 for both—less than cost of one engine. Cable Tool Supply Company, P. O. Box 305, Princeton, Indiana. Phones: FUlton 5-4831, 5-4832.

PIPE—35,000 Ft. 8⅝" surface T&C $1.35 & up per ft. Jamison Pipe & Tool Co. Ph. 80, Madison, Kansas.

USED REDA PUMP. 135 HP Mtr., 36 Stage Type Y 180, Protector, 150 KVA Maloney Transformer & Switch, 100 HP Control Panel, with 1650' cable. Contact Crescent Oil Well Supply Co., 809 Kennedy Bldg., Tulsa, Oklahoma. Ph.—LU 4-7073.

2 ROTARY RIGS, 7,500' and 9,000' maximum, excellent condition, now running, liberal terms. Box L-255, The Oil and Gas Journal, Tulsa, Oklahoma.

FOR SALE:

1—Used hydraulic casing pulling rig, in good condition and ready to operate $6,000.00

1—Used Cardwell all steel draw works, Serial #KL-14 ..... $1,200.00

1—Used 75 KVA E. M. Mfg. Co. 60-KW Generator Serial #2691 with Superior Type GB3 engine Serial #82178, Type 56 Happy engine jacket water cooler, 30 HP Square D master switch, 440-volt Cutler-Hammer control, 3x3½ Wisconsin Type VE4 air-cooled motor direct connection to 3-HP Gardner-Denver compressor, volume tank, and 18½'x16½' portable steel sectional building $1,900.00

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WICHITA FALLS, TEXAS.

GUEST & MOLLER, INC.
1109 CITY NATIONAL BUILDING
WICHITA FALLS, TEXAS
PHONE 322-7869

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WELL DRILLS - CORE DRILLS. Everything for well and core drilling in both new and used equipment at money saving prices. Fishing tools rented. Send for bulletins. Pressey & Son, Pueblo, Colo.

DRILLING RIG FOR SALE to highest bid, U-20 Unit Rig complete less drill pipe. Inventory list will be mailed together with bidding instructions upon request. Shell Oil Company, P. O. Box 1509, Midland, Texas, Attention: B. Hawkins.

EQUIPMENT BARGAINS

11 **KINNEY ASPHALT PUMPS** Jacketed Type SD422-SD534-SD848

48 **HEAT EXCHANGERS,**
Steel 800—4,400 Sq. Ft.
Admiralty 350—4,600 Sq. Ft.
Cupro Nickel 177—5,200 Sq. Ft.

4 **BROWN FINTUBE EXCHANGERS,** 189 Sq. Ft.

6 **SUCTION HEATERS FINTUBE,** 101—1,098 Sq. Ft. New.

2 **PETROCHEM HEATERS,** 19 & 25 Million BTU.

1 **AIR HEATER,** 10,000 SCFM 100°-1200° Direct Fired.

1 **AIR BLOWER,** 11,800 CFM, 11 psi, 600 H.P. Turbine Drive.

2 **TOWERS,** 3' x 38'—8 Trays, 40 psi. 2'6" x 60'—24 Trays, 180 psi.

1 **OTIS ELEVATOR,** 2,500#, 182' Travel

1 **REBOILER,** 165 Sq. Ft., 150 psi. shell, 300 psi. tubes.

5 **STEAM PUMPS,** 8" x 4½" x 12"—4½" x 4" x 6"—8" x 4" x 6"

3 **CENT. PUMPS,** Vertical XP Motors
2,600 GPM at 173 Ft.—300 H.P.
1,500 GPM at 150 Ft.—125 H.P.
680 GPM at 150 Ft.— 40 H.P.

1 **PROPORTIONEERS PUMP,** 3XL, 5 H.P.

Heat & Power Co., Inc.
306 Thompson Bldg., Tulsa 3, Okla.
60 East 42nd St., New York 17, N. Y.

EQUIPMENT WANTED

36L BUCYRUS-ERIE or equivalent, less tools. Box L-224, The Oil and Gas Journal, Tulsa, Oklahoma.

HELP WANTED

CHEMICAL ENGINEERS:
If you have 1 - 5 years experience in process design or manufacturing technical service—If you want the full load of responsibility and unlimited opportunity that only a small company can offer—
Write G. D. Kerns,
Technical Director,
THE VICKERS PETROLEUM CO., INC.
POTWIN, KANSAS

HELP WANTED

ATTENTION:

OVERSEAS Oil Companies, Drilling Contractors & Petroleum Personnel

The Overseas Craftsman's Association announces the establishment of a Petroleum Division exclusively designed to better coordinate employment and personnel activities for both employees and employers interested in foreign and domestic operations.

For further details write C. H. Looper, Manager Petroleum Division

Overseas Craftsman's Association

428 South Spring Street, Los Angeles 13, California.
or 170 Broadway, New York, N. Y.

CHEMICAL ENGINEER—Chemical Plant in Central States seeks graduate chemical engineer with a minimum of three years experience in the Petro Chemical Process Industry. Willing to develop into Production Management. Send full resume and salary requirements to—Box L-264, The Oil and Gas Journal, Tulsa, Oklahoma.

PRODUCTION ENGINEER: Large, independent, integrated oil company has opening for young man with from two to five years experience in drilling, testing, well completion, and other phases of production. Submit full resume along with transcript of grades. Box L-253, The Oil and Gas Journal, Tulsa, Oklahoma.

DRILLING ENGINEER: Large, independent contract drilling company has opening for man with from two to eight years experience in all phases of drilling. Prefer major in mechanical or petroleum engineering with better than average grades. Salary commensurate with qualifications and experience. Furnish full resume along with transcript of grades. Box L-254, The Oil and Gas Journal, Tulsa, Oklahoma.

FOREIGN EMPLOYMENT: Lists about 40 U. S. oil companies, 30 drilling contractors, operating abroad, showing where apply foreign jobs. $5 cash. OIML Co., Box 2603, Tulsa, Okla. Will compile domestic oil lists. Write your needs.

GEOLOGICAL EMPLOYMENT—DALLAS—Fort Worth. Timely survey of top 60 oil organizations gives present opportunities and future plans. $5.00. Earth Science Listing Service, Box 991, Dallas 21, Texas.

Petroleum Engineer

with 5 to 8 years practical field experience. Location South Louisiana. Applications will be held confidential. Apply

BOX L-270,

THE OIL AND GAS JOURNAL,
TULSA, OKLAHOMA.

Chemical Engineers

Openings exist for chemical engineers with up to approximately five years' experience in refinery technical service, process control, or design.

Send resumé to

PONTIAC REFINING CORP.
P. O. BOX 1581
CORPUS CHRISTI, TEXAS

PETROLEUM ENGINEER

Petroleum Department of major New York financial institution has opening for a recent graduate petroleum engineer with some field work and experience in reservoir and evaluation engineering. Salary commensurate with experience.

Please reply giving full particulars on education, experience, personal data, including recent picture, references and salary expected. All replies will be confidential.

Box L-227, The Oil and Gas Journal,
Tulsa, Oklahoma.

HELP WANTED

ECONOMIC ANALYST—Major oil company, Texas, requires man with master's degree in economics, proficiency in statistics and price theory, experience in business research. Send details of academic training, experience, personal history to: Box L-256, The Oil and Gas Journal, Tulsa, Oklahoma.

RADIOACTIVITY Logging Operators with perforating experience openings in Oklahoma and Kansas. Jetwell, Inc., 932 Mayo Building, Tulsa, Oklahoma.

Property Evaluation Engineer

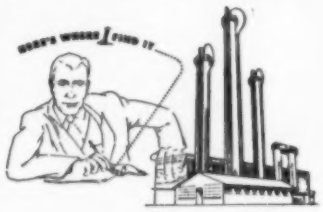
Petroleum Engineer with 6 to 8 years experience in property evaluation and appraisal, producing and non-producing properties. Will also do general Reservoir Engineering. Staff position, large independent, Gulf Coast location. Salary open. Inquiries confidential.

Write giving detailed information to

Box L-271,

The Oil and Gas Journal,
Tulsa, Oklahoma.

Can You Help This Man?



It's a good bet that you can!

Actually he's a lot of men. Men that have jobs to fill or want a new position; equipment to buy or sell; production, acreage, leases, or real estate to sell or buy; or a business opportunity. He may be looking for your services, maps, or field records.

Why Not Tell Him You Have What He Wants With

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For assistance on classified ads, write

THE OIL AND GAS JOURNAL
P. O. Box 1260 — Tulsa, Okla.

HELP WANTED

A GROWING SOUTHWESTERN Company in the oil industry is seeking replacement for its manager of Industrial Relations. Applicants should have a college major or have done graduate study in the industrial relations personnel field. Five years of experience in responsible industrial relations position is a requisite. The man we are seeking must have executive potential. Please reply in writing giving a brief resume of your personal qualifications, experience, and reasons for desiring to change from your present position. All replies and correspondence will be held in strictest confidence. Please address replies to Box L-244, The Oil and Gas Journal, Tulsa, Oklahoma.

SITUATION WANTED

GEOLOGIST—2 years foreign seismic experience, desire job as petroleum or engineering geologist. Box L-249, The Oil and Gas Journal, Tulsa, Oklahoma.

OVERSEAS EMPLOYEES & EMPLOYERS See our boxed-displayed ad under "Help Wanted" for details of your opportunity. Overseas Craftsman's Association, Los Angeles-New York.

GEOLOGIST, BS, 27, Married, two children. 3½ years Major Oil Company experience Texas, Louisiana. Consider domestic or foreign. Box L-243, The Oil and Gas Journal, Tulsa, Oklahoma.

SALES ENGINEER—Manufacturers' Representative seeking exclusive machinery accounts—specialties—Gulf Coast area—headquarters Houston, Texas. Box L-269, The Oil and Gas Journal, Tulsa, Oklahoma.

ATTORNEY—Land and Contracts—five years major company experience—presently employed—will relocate. Box L-267, The Oil and Gas Journal, Tulsa, Oklahoma.

SALES ENGINEER would like contact with manufacturer seeking agent or outlet in Oklahoma. Fourteen years oil field sales and management experience. Industry references. Currently employed. Box 9812, Oklahoma City, Oklahoma.

OFFICE MANAGER-ACCOUNTANT — Financial statements, records, responsibilities. 8 years experience, production, drilling, leasing. B.S. Degree. Desires change. Box L-260, The Oil and Gas Journal, Tulsa, Oklahoma.

MANUFACTURERS' REPRESENTATIVE, establishing in Odessa May 1st, wants additional line of maintenance items to handle. Have 9 years oil field selling experience in West Texas. Excellent contacts. Box L-262, The Oil and Gas Journal, Tulsa, Oklahoma.

PRODUCTION ENGINEER—Management potential with aggressive oil and/or gas producer sought by petroleum engineer with three years varied experience with major company. BS degree, 26, single. Experience summary and references available. Box L-261, The Oil and Gas Journal, Tulsa, Oklahoma.

I WILL INSTALL, service and maintain your orifice meters, figure your charts and do your gas accounting. Over twenty years experience. Prefer Oklahoma City area. Box L-259, The Oil and Gas Journal, Tulsa, Oklahoma.

GEOLOGIST—15 years—Rocky Mountains, Gulf Coast, Mid-Continent—2 years Graduate Geology—2 years Law—Diversified experience: Geological, Land, Drilling, Completions, Management—Desire affiliation aggressive Independent. Box L-257, The Oil and Gas Journal, Tulsa, Oklahoma.

General Manager

Nineteen years experience—Varied in geological and seismic exploration, leasing, farmouts, drilling, production, engineering, joint operations, legal and tax problems of individuals and corporations. Louisiana-Texas-New Mexico-Oklahoma. Age 41, BS Geological Engineering.

Box 640,

Norman, Oklahoma.

SITUATION WANTED

GEOLOGIST—8½ years Gulf Coast, 1 year Rocky Mtn.; M.S., trained in administration, developing exploration programs, developed and submitting prospects; desires position with company entering exploration, or expanding; prefer Houston, consider any area. Box L-266, The Oil and Gas Journal, Tulsa, Oklahoma.

GEOLOGIST, PhD., 36, married, 5 years experience, 2 surface western United States, 3 subsurface western Venezuela, presently employed, desires position with company actively engaged in or contemplating foreign oil exploration. Box L-258, The Oil and Gas Journal, Tulsa, Oklahoma.

PETROLEUM GEOLOGIST—Desires Geologic employment with major oil company or independent. Will consider any offer. One year experience in South Texas, North Dakota, Alberta, with well logging unit; including sample analysis. Veteran, 26, single, B.S. Biology, B.A. Geology. Box L-263, The Oil and Gas Journal, Tulsa, Oklahoma.

PRODUCTION MANAGER-SUPT.
Age. 49. Presently employed by Independent as Production Manager in charge of drilling and production. 25 years experience Mid-Continent, West Texas, West Coast and Rockies. Box L-250, The Oil and Gas Journal, Tulsa, Oklahoma.

ESTABLISHED MANUFACTURERS Representative operating in south Louisiana, calling on oilfield supply stores, drilling, and production Co.s, wishes additional lines. Box L-247, The Oil and Gas Journal, Tulsa, Oklahoma.

GEOLOGIST, PETROLEUM ENGINEER, SUPERINTENDENT
8 years intense experience: exploration, drilling, production in California, Rocky Mountains with large independent producer; managerial 4 years. Capable handling complete operations from ideas to tanks; domestic or foreign. Box 31 RO 536, The Oil and Gas Journal, 4041 Marlton Ave., Los Angeles 8, Calif.

MANUFACTURING
Management opportunity sought by man with seven years responsible experience in outside sales, purchasing, and traffic with oil industry equipment manufacturers. Now employed. College graduate, veteran, married, age 30. Will relocate. Box L-241, The Oil and Gas Journal, Tulsa, Oklahoma.

COMM. PILOT—AIRLINE S. M. E. L., Instrument and Flight Instructor, T. T. 750 Hrs., 2 Yrs. College Eng., Married, Desire Perm. position as Executive Pilot or co-pilot. Don W. Burks, 1111 N. 24 St., Billings, Mont., phone 9-3019.

GEOLOGIST, 31 years old, single, 4 years exploration experience with a major wants Alaskan or foreign employment. Box L-248, The Oil and Gas Journal, Tulsa, Oklahoma.

PETROLEUM ENGINEER: Age 27. Have completed major company training program. B.S., University Wisconsin. Edward Mathews, 2521 No. 93rd St., Milwaukee, Wis.

PRODUCTION FOR SALE

130 ACRES with 7 oil wells producing 35 bbls. and one disposal well. Clyde Endicott. Day: phone 554, Sedan, Kans. Night: Phone MEdford 4-7346, Peru, Kans.

BUSINESS SERVICE

THE VENEZUELAN

law firm of Philip A. Mallen offers its legal services

to companies that are planning to operate **in the oil and gas field in Venezuela.**

We can plan the best form of organization for your particular operation, considering both **U. S.** and **Venezuelan** oil and tax laws.

Escritorio Mallen
Apartado 3249
Caracas - Venezuela

PRODUCTION WANTED

PRODUCTION WANTED: Producing royalties, anywhere. Rebel Oil Company, Box 96, Hobbs, New Mexico.

WANTED: Oil properties. 100 to 5,000 barrels daily in Oklahoma and Kansas. Morris Sitrin, P. O. Box 1160, Tulsa, Okla.

ROYALTIES

OFFERING CHOICE ROYALTIES with large estimated reserves per dollar invested. A. S. Berry, 109 Midco Bldg., Tulsa, Okla.

LEASE AND DRILLING BLOCKS

300 ACRES SURFACE and half minerals $70. acre. Located Sec. 24, Twp. 28N, Range 17E, Nowata County, Okla. 240 acres leased to Carter Oil Co. Wells Land Co., Nowata, Okla.

120 ACRE LEASE. Okmulgee, Okla. 1,800 Ft. Red Fork Sand. Production adjoining. $20 acre. Sabin, Box 707, Pacific Palisades, Calif. GL 4-4031.

20.75 ARPENTS Oil Land in North Cankton, La. oil field for sale with all royalties. Not leased. $40,000. Box L-265, The Oil and Gas Journal, Tulsa, Oklahoma.

HAVE SEVERAL 160 acre tracts in Osage. Consider small override or oil payment for immediate drilling. For list call FEderal 2-1737 or write Box 977, Ada, Oklahoma.

CUMBERLAND COUNTY, Kentucky Shallow drilling boom area—370 acres, 80 acres, 55 acres, 40 acres. Separate locations, partly proven 5 and 10 year leases. Rental $1.00 per acre due 1960. Price $5.50 per acre, ⅛ override. Come, phone, wire, write—Wilbur V. Cravens, Russell Springs, Kentucky.

OKMULGEE CO., OKLAHOMA. 2300 ft. Dutches sand well 80 acres in good producing area. Need some financial help. Box L-252, The Oil and Gas Journal, Tulsa, Oklahoma.

FOR SALE—Minerals in Montana portion Williston Basin. Howard Helmer, Box 385, Poplar, Montana.

WANT SHALLOW ACREAGE for three well test program, offset or extension, preferably farmout. Write U. S. Anderson, 8350 Santa Monica Blvd., Los Angeles 46, California.

¼ INTEREST IN 160 ACRES offset to production. 800 Ft. sand. Location staked and am ready to drill. Box 96, Sedan, Kansas.

DESIRE DIRECT contact with Purchaser interested in acquiring Oklahoma Producing Leases with 29 wells—490 bbls. daily production. Box L-237, The Oil and Gas Journal, Tulsa, Oklahoma.

Green County, Kentucky

Boom Area Leases—in fairway, 4400 acres in large or small blocks. Some direct offsets or close to production. Low lease costs for immediate drilling deals. Write for full particulars.

Box L-183, The Oil and Gas Journal, Tulsa, Oklahoma.

Kentucky Boom Area

Proven and unproven leases in GREEN COUNTY, KY., also adjoining counties. Shallow drilling.

Drilling deals arranged.

Write or Call
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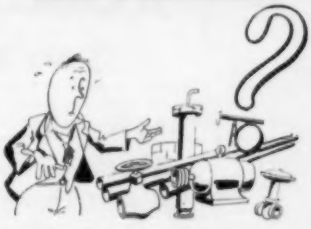

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PIPELINE CONSTRUCTION

(Continued from page 210)

Neuquen Province, Argentina, to Bahia Blanca on the coast.
Status: Bids requested.
Project: 625 miles of 12-in. from Mendoza to San Lorenzo.
Status: Planned.

Foreign Products Pipelines

- **Kuwait Oil Co., Ltd.,** London.
Project: 12 miles of 16, 20, 24-in. on Ahmadi North Pier.
Status: Under way.
Completion: First quarter 1959.
- **National Iranian Oil Co.,** Azna, Iran.
Project: 200 miles of 6 and 8-in. extension of the Trans-Iranian line from Teheran northward to Resht on the Caspian Sea.
Status: Under way.
Contractor: **B. & M. Construction Co.,** Oklahoma City; **Cheney Construction Co.,** Seattle; **Merritt-Chapman & Scott,** New York City.
Completion: April 1959.
- **Petroleos Mexicanos**
Project: Line from Mexico City to Toluca.
Status: Planned.
Project: Line from Mexico City to Cuernavaca.
Status: Planned.
Project: Line from Monterrey to Torreon.
Status: Planned.
- **Union of Soviet Socialist Republic.**
Project: 2,315 miles of 28-in. Trans-Siberian crude-products line from Ufa Tuimaza fields in Bashkiria to Irkutsk near Lake Baikal.
Status: Under way.
- **Yacimientos Petroliferos Fiscales (Argentina),** Buenos Aires.
Project: 652 miles of 10-in. from Lujan de Cuyo to Buenos Aires.
Status: Planned.

Foreign Natural Gas Pipelines

- **Attock Oil Co., Ltd.,** London.
Project: 60 miles of line from Dhulian field to Rawalpindi in West Pakistan.
Status: Planned.
- **Cuban Gas Transmission Co.**
Project: 500-mile line from Campeche area of Mexico across Yucatan and a 150-mile line on the ocean floor to Havana.
Status: Under study by **Ebasco Services.**
- **Gaz de France.**
Project: 550 miles of 16 to 24-in. from Lacq field in southwestern France to Paris, plus 12 to 16-in. laterals to Lyons, making a 1,000-mile system.
Status: Under way.
Contractor: French contractors.
Completion: Line to Lyons to be completed March 1959; line to Paris in 1960.
- **Japan Gas Chemical Industries.**
Project: 10 miles of 10-in. from its company-owned fields to plants in Niigata, Japan.
Status: Under way.
Completion: Spring 1959.
- **Mene Grande Oil Co.,** Caracas, Venezuela.
Project: 20 miles of 12-in. from Soto to Mata.
Status: Planned.
Completion: 1959.
- **Petroleos Mexicanos,** Mexico D. F.
Project: 130 miles of 22-in. to parallel a 14-in. line from Reynosa to Monterrey.
Project: 490 miles of 24-in. from Jose Colomo field in the State of Tabasco to Mexico City.
Status: Preliminary work under way.
Completion: March 1960.
Project: Line from Pemex City to Irapuato.
Status: Planned.
Completion: 1960.
Project: Line from Monterrey to Torreon.
Status: Planned.
Completion: 1960.
- **Sui Gas Transmission Co.,** Multan, Punjab, India.
Project: 130-mile extension of the new 310-mile, 16-in. Multan-to-Sui, Pakistan line. Extension will terminate at Lyallpur.
Status: Planned.
- **Union of Soviet Socialist Republic.**
Project: A 465-mile line from Karadag near Baku to Tbilisi and Erevan.
Status: Under way.
Completion: 1960.
Project: A 127-mile line across the Turkmenian Desert from Kizyl-Kum to the Caspian Sea port of Krasnovodsk.
Status: Under way.
Project: Two parallel lines, each over 1,200 miles long, from Gazly, near Bukhara, northward to Sverdlovsk and Chelyabinsk.
Status: Proposed.
Project: Line from near Bukhara, through Tashkent to Chimkent, Dzhambul, Frunze, and Alma-Ata near the border.
Status: Proposed.
Project: Line from Sverdlovsk to Omsk, Kemerovo and Tomsk.
Status: Proposed.
Project: Line from Berezovo field to Sverdlovsk.
Status: Proposed.
Project: Line from Stalingrad to Gorky and to Moscow.
Status: Proposed.
Project: Line from Dzhebol field to Izhevsk and to Sverdlovsk.
Status: Proposed.
Project: Line from Gorky to Kazan.
Status: Under way.
Project: Line from Saratov to Sverdlovsk, with branches into Stepanovskoe field.
Status: Proposed.
Project: Line from Kanevskoe (Kransnodar) field to Sulkhumi.
Status: Proposed.
Project: Line from Shebelinka field to Rostov, to Odessa, and northward to connect with proposed line from Lvov to Leningrad.
Status: Proposed.
Project: Line from Riga to proposed line from Lvov to Leningrad.
Status: Proposed.
Project: Line from Rostov to Moscow.
Status: Proposed.
Project: Line from Severo-Stavropolskoe (North Stavopol) field to Moscow.
Status: Under way.
Project: Line from Leningrad to Moscow.
Status: Under way.
- **Yacimientos Petroliferos Fiscales (Argentina),** Buenos Aires.
Project: 1,015 miles of 24-in. from Camp Duran to Buenos Aires.
Status: Under way.
Contractor: **SARGO** (Fish Engineering Corp., Fish Northwest Constructors, Inc., Clark Brothers, North American Utility, Construction International Co.), subcontracted to COGAR (River Construction Corp., Ft. Worth, Tex.), Milton Brazier, supt. for 700 miles from Buenos Aires to Tucuman, office at Buenos Aires; E. L. "Tex" Maggard, supt. for 400 miles from Campo Duran to Tucuman.
Completion: August 1960.
Project: Line from Comodoro Rivadavia to Buenos Aires with a spur to Plaza Huincul field in Neuquen province. Line will be 26-in. to the connecting point for the Plaza Huincul link and 30-in. from the connection to Buenos Aires.

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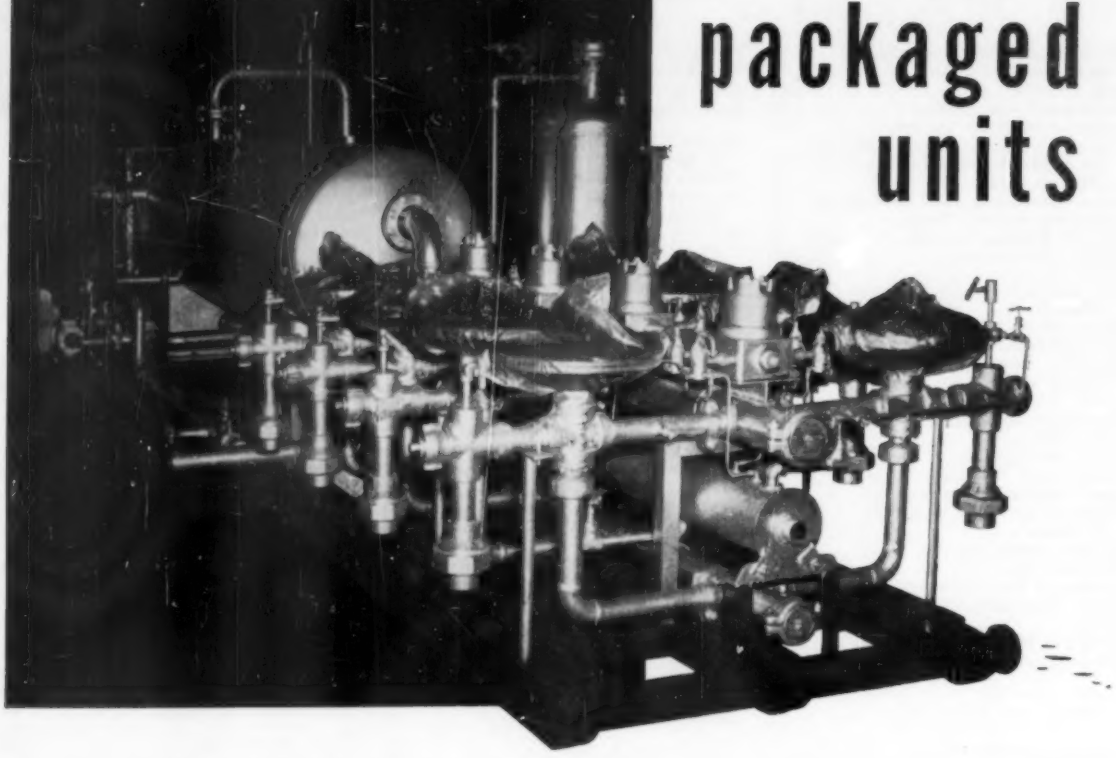

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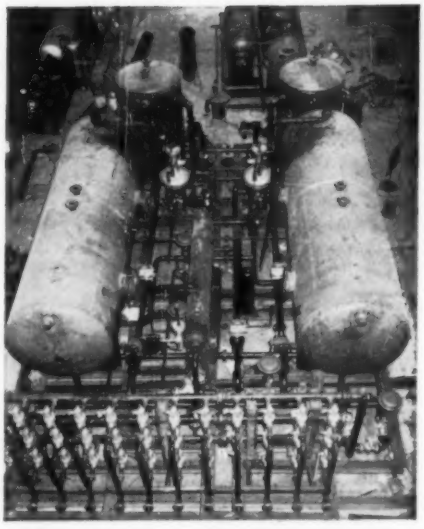

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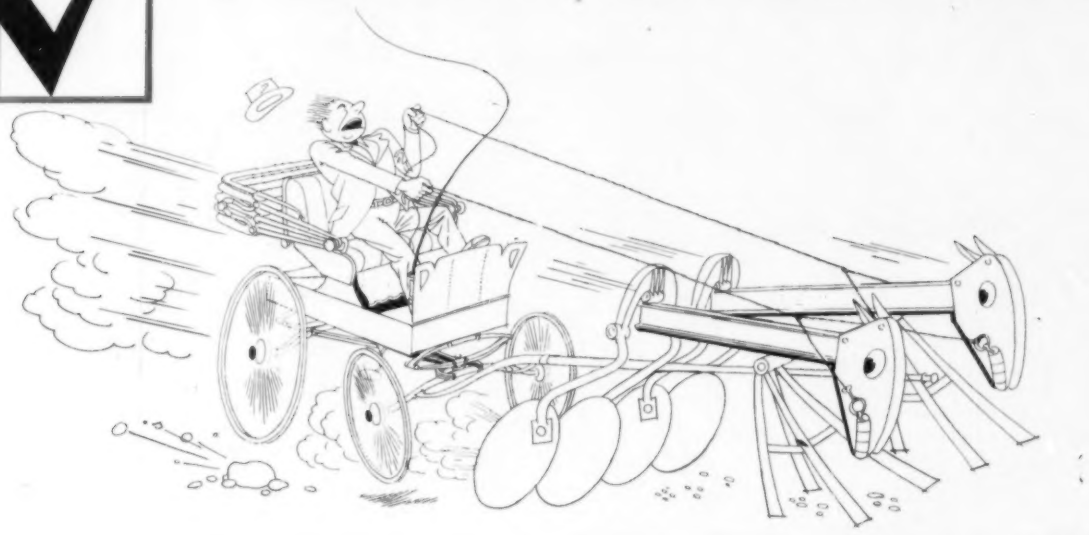

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